THE SOUTH AFRICAN MUSEUM'S *MEIRING NAUDE* CRUISES

PART 14

FAMILY MYCTOPHIDAE (OSTEICHTHYES, MYCTOPHIFORMES)

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(With 19 figures)

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ABSTRACT

Fifty-seven species of Myctophidae (Osteichthyes, Myctophiformes) are recorded from off the east coast of South Africa. No new species are described; thirteen species are recorded for the first time in the southern African region. The Myctophidae include both mesopelagic and bathypelagic high-oceanic species, and pelagic pseudoceanic species.

CONTENTS

INTRODUCTION

From 1975 to 1979, the Department of Marine Biology, South African Museum, undertook a series of sampling cruises off the east coast of southern Africa in order to investigate the deep benthic fauna (at depths greater than 500 m) and the mesopelagic fauna of that region. This paper deals with the lantern-fishes (Family Myctophidae), comprising some 800 specimens, obtained during the five cruises. The stations occupied are given in Figures 1 and 2. Station data have been given by Louw (1977, 1980), so that the reader should refer to these publications for details.

Genera and species are arranged alphabetically for easier reference both in the *Species list* and in the *Systematic account* but, in the latter case, only the species that are recorded for the first time in the southern African region (the area between 20°S and 40°S and from 10°E to 40°E) or problematic species are described. For these, synonymies include references to type specimens (with type localities given in parentheses) and references pertinent to the southern African region. Where relevant, remarks are made on other species.

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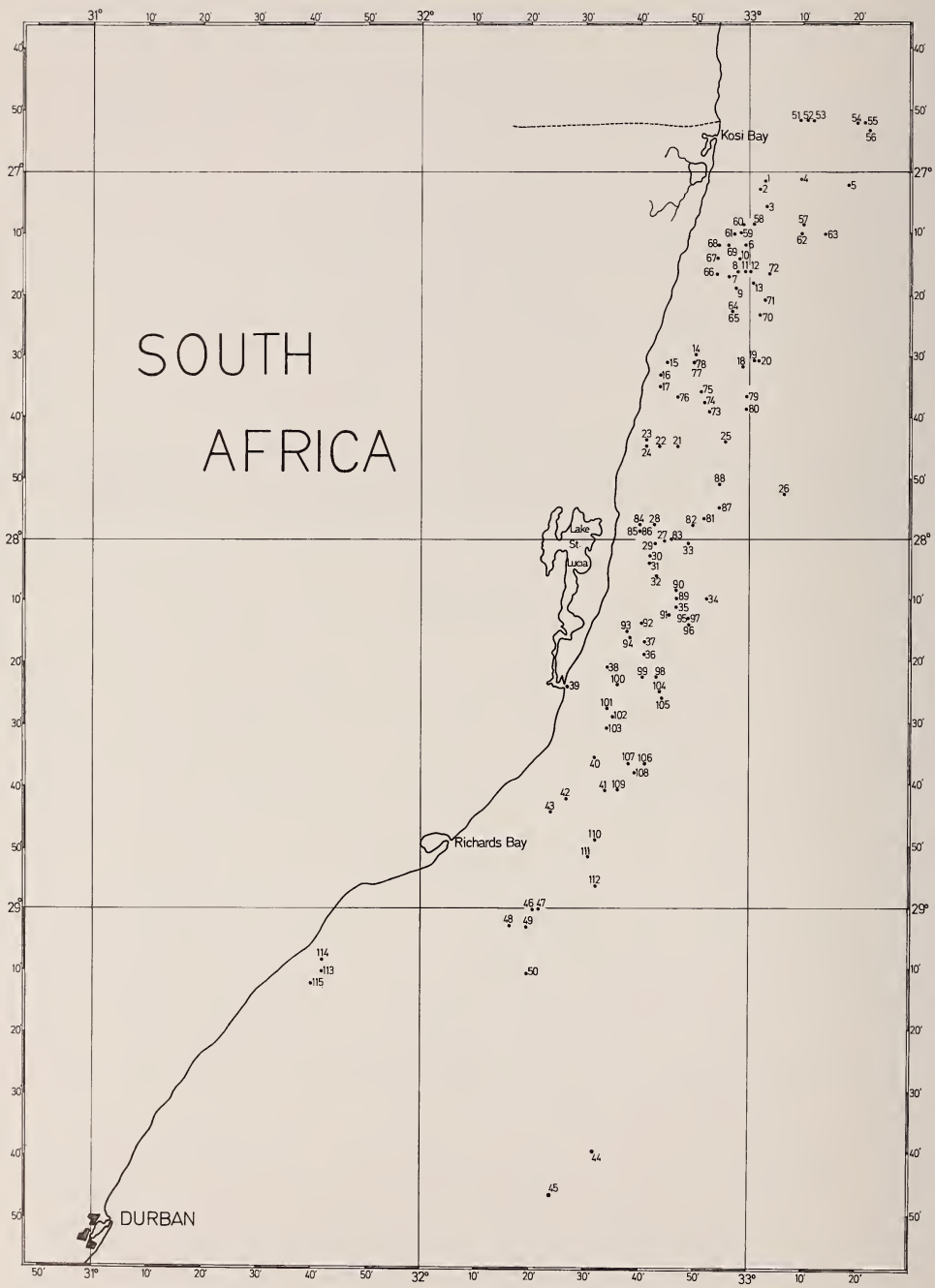

Fig. 1. Stations occupied off the east coast of South Africa, north of Durban, during the cruises of the South African Museum on the R.V. *Meiring Naude*.

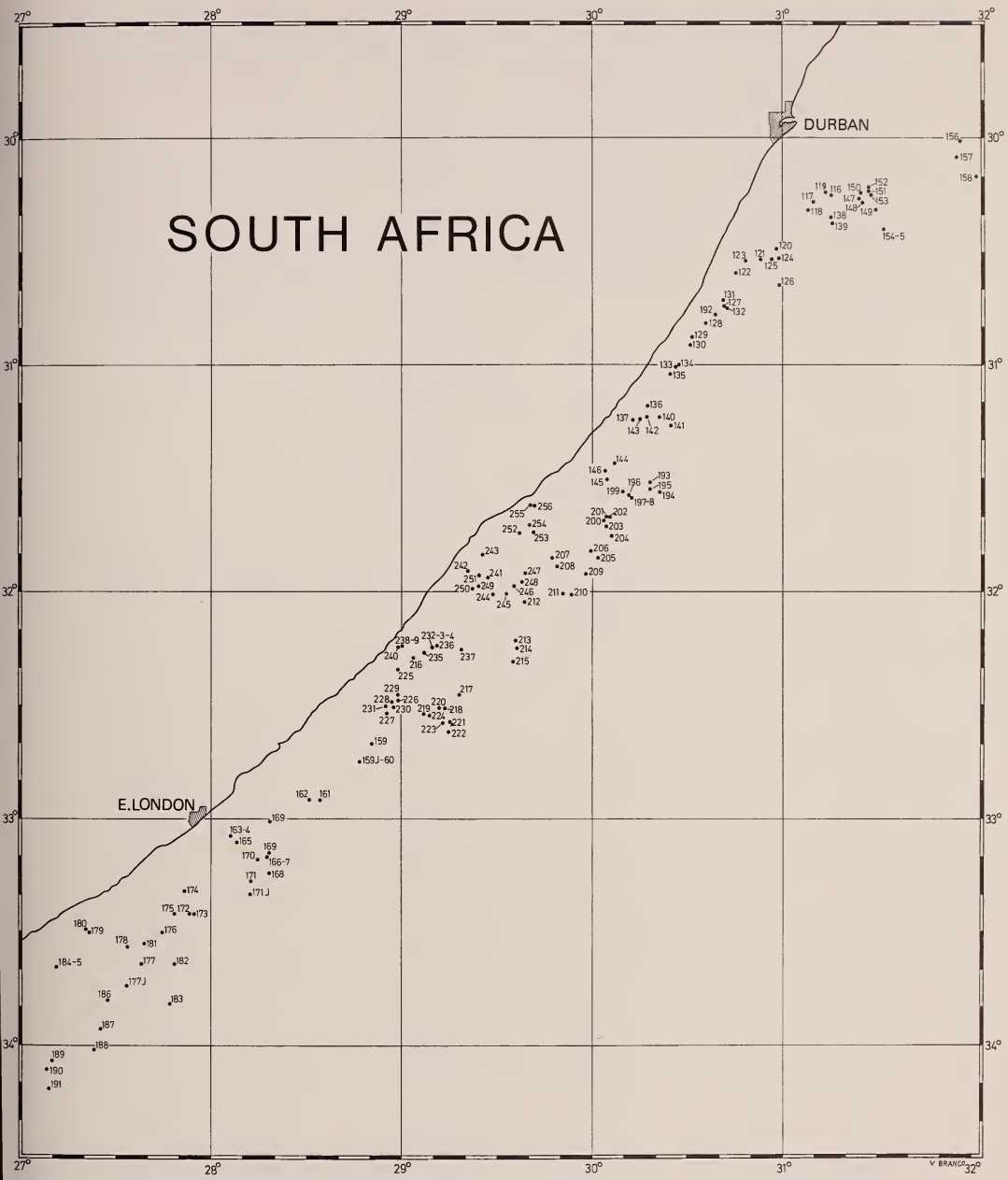

Fig. 2. Stations occupied off the east coast of South Africa, south of Durban, during the cruises of the South African Museum on the R.V. *Meiring Naude*.

Methods for taking measurements and counts follow Nafpaktitis (1973) and their abbreviations follow Hulley (1981). Additional abbreviations include:

SAM South African Museum catalogue number
SM *Meiring Naude* station number
A *Africana II* station number (Hulley 1972; illustration only)
IK IKMT survey station number (Grindley & Penrith 1965; illustration only)

Ranges in standard length (SL) for each species at each station are given in the *Species list*; maximum lengths are given in the species descriptions and are taken from the literature. Photophore groupings and nomenclature are in accordance with Paxton (1972). The state of sexual maturity in the case of females is given as follows:

Stage I Ovaries immature, eggs minute and transparent
Stage II Ovaries immature, eggs small and granular
Stage III Ovaries developing, both large and small eggs present (no oil droplets)
Stage IV Ovaries developed, eggs large (no oil droplets)
Stage V Ovaries mature, eggs large with oil droplets
Stage VI Ovaries spent

All specimens are housed in the collection of the Department of Marine Biology, South African Museum.

SPECIES LIST

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Benthosema fibulatum	29041	1	15,0	87S	45–0
	29060	1	13,8	62D	209–0
	29085	1	13,0	79D	200–0
	29145	1	15,3	70D	200–0
Benthosema suborbitale	27543	2	20,9–28,8	97	467–0
	27663	1	26,1	96	465–0
	27982	2	25,5 + head	119	750–0
	27983	2	25,5–28,4	125	415–0
	27984	1	22,0	126	464–0
	27985	2	26,1–26,5	132	830–0
	27986	1	23,2	139	250–0
	27987	1	19,6	153	664–0
	28316	1	24,7	190	658–0
	28365	12	16,2–28,4	191	542–0
	28701	1	21,0	199	250–0
	29032	1	11,3	110S	45–0
	29036	1	13,8	12	200–0
	29039	1	23,3	11	150–0
	29049	3	13,1–18,3	124D	212–0
	29054	1	25,0	54D	200–0
	29055	2	11,1–11,8	13	274–0
	29091	2	12,7–26,7	34	212–0
	29124	1	10,5	188D	212–0
	29152	1	22,9	80	359–0
	29161	1	10,3	54S	45–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Bolinichthys indicus	27665	1	16,2	112	488–0
	27990	1	23,2	126	464–0
	27991	1	38,0	140	1120–0
	27992	1	24,0	145	1129–0
	28369	1	17,2	191	542–0
	29029	1	12,2	118D	212–0
	29042	1	12,0	80	359–0
	29078	1	19,7	20	580–0
	29208	1	12,8	168	816–0
	29609	1	12,4	79D	200–0
Bolinichthys supralateralis	26614	1	45,0	52	720–0
	27102	1	29,7	25	600–0
	27110	1	23,0	25	600–0
	27529	1	23,1	105	775–0
	27988	1	26,4	119	750–0
	27989	2	15,8–20,9	132	830–0
	28284	1	26,7	168	816–0
	28309	1	18,9	160	583–0
	29028	1	12,4	80	359–0
	29143	1	14,9	45	212–0
Ceratoscopelus warmingii	27517	1	22,8	112	488–0
	27538	1	28,2	88	297–0
	27662	1	16,4	97	467–0
	27993	1	17,7	126	464–0
	27994	2	21,0–51,5	132	830–0
	27795	2	17,6–31,2	139	250–0
	27996	2	36,9–43,3	140	1120–0
	27997	4	18,2–43,4	153	664–0
	27998	1	18,6	154	500–0
	27999	6	29,1–42,7	148	750–0
	28283	5	17,6–36,1	190	658–0
	28285	1	23,1	160	583–0
	28286	1	15,9	168	816–0
	28287	3	17,4–24,7	167	1091–0
	28288	1	39,3	173	683–0
	28289	1	18,1	186	583–0
	28655	1	16,3	220	1416–0
	28678	1	27,0	218	916–0
	28702	1	36,0	214	1390–0
	29037	1	16,9	104D	200–0
	29052	1	16,7	87D	200–0
	29098	1	16,3	79D	200–0
	29093	1	16,4	143D	212–0
	29113	1	18,9	200D	212–0
	29131	1	18,3	188D	212–0
	29150	1	26,8	12	200–0
Diaphus aliciae	28332	1	16,8	174	760–0
	29142	1	12,9	152D	212–0
Diaphus brachycephalus	27113	1	26,3	33	400–0
	28361	2	29,0–30,3	160	583–0
Diaphus dilematus	27105	4	28,4–34,6	18	600–0
	27125	1	21,2	49	400–0
	27498	1	34,7	111	514–0
	27504	5	31,0–32,6	63	140–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Diaphus diadematus (contd.)	27514	3	28,8–36,8	112	488–0
	27524	2	24,8–29,6	105	775–0
	27536	2	24,5–31,9	88	297–0
	27542	1	21,7	55	400–0
	27544	1	34,5	97	467–0
	28000	1	29,7	132	830–0
	28001	1	32,5	148	750–0
	28002	3	25,4–29,5	153	664–0
	28003	1	31,7	154	500–0
	28342	1	25,6	168	816–0
	28672	2	28,0–30,3	221	1170–0
	28673	1	24,6	211	415–0
	29127	1	12,7	222D	193–0
	29134	1	10,8	80	359–0
	29135	2	9,7–14,3	124D	212–0
	29151	1	10,7	143D	212–0
	29157	1	15,3	62D	209–0
	29172	1	19,3	104D	200–0
	29177	2	13,8–15,2	95D	200–0
	29185	1	14,9	20	528–0
Diaphus effulgens	27500	1	33,1	111	514–0
	27522	2	25,0–31,0	112	488–0
	28004	2	31,8–37,4	132	830–0
	28248	1	31,8	132	830–0
	28290	1	35,6	191	542–0
	28291	1	31,7	160	583–0
	29178	2	20,3–29,0	118D	212–0
Diaphus garmani	27511	1	26,4	56	397–0
	29180	1	30,1	80	359–0
	29184	2	12,4–14,3	143D	212–0
	29188	1	13,1	136D	212–0
Diaphus hudsoni	28006	1	78,6	128	930–0
	28292	1	90,0	190	658–0
Diaphus jenseni	28293	1	26,6	183	474–0
Diaphus lucidus	27523	1	34,9	112	488–0
	27530	1	42,7	105	775–0
	28007	1	32,9	126	464–0
	28008	3	15,0–28,8	132	830–0
	28009	2	30,8–57,3	139	250–0
	28010	1	29,6	140	1120–0
	28011	2	39,9–46,9	153	664–0
	28294	1	33,4	160	583–0
	28295	6	17,7–39,5	168	816–0
	28296	2	12,5–38,3	170	708–0
	28302	4	16,4–41,7	191	542–0
	28674	1	46,7	204D	212–0
	28675	1	26,0	208	1320–0
	28676	1	36,3	216	0
	29133	1	16,5	12	200–0
	29149	3	37,9–40,5	143D	212–0
	29176	1	17,2	80	350–0
Diaphus luetkeni	27497	1	24,6	111	514–0
	27545	1	19,7	55	400–0
	28012	2	29,0–39,9	153	664–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Diaphus luetkeni (contd.)	28013	1	19,8	119	750–0
	28014	1	37,5	148	750–0
	28015	2	20,2–28,0	132	830–0
	28016	1	40,6	139	250–0
	28017	1	36,8	138	830–0
	29174	1	16,3	143D	212–0
Diaphus metopoclampus	27503	1	33,0	63	140–0
	27525	1	49,7	105	775–0
	27664	1	18,8	112	488–0
	28018	1	25,3	132	830–0
	28297	1	12,0	187	982–0
Diaphus mollis	27104	1	56,1	25	600–0
	27499	1	42,0	111	514–0
	27515	1	31,7	112	488–0
	27526	2	29,4–31,9	105	775–0
	27537	1	45,0	88	297–0
	28019	1	35,7	119	750–0
	28020	1	15,0	125	415–0
	28021	1	29,9	126	464–0
	28022	2	28,6–31,7	132	830–0
	28023	1	49,5	145	1129–0
	28318	1	19,4	190	658–0
	28341	1	15,6	168	816–0
	28351	2	23,4–25,5	183	474–0
	28352	1	19,3	186	583–0
	28360	1	27,5	160	583–0
	28363	1	13,4	159	690–0
	28685	1	57,3	223	670–0
	29125	1	15,5	188D	212–0
	29136	1	14,2	95S	45–0
	29137	1	13,3	12	200–0
	29148	2	14,7–35,4	152D	212–0
	29155	2	23,5–33,5	20	528–0
	29173	1	14,8	104D	200–0
	29187	1	11,3	95D	200–0
Diaphus nielseni	28029	2	27,7–35,0	148	750–0
Diaphus parri	28684	1	25,0	221	1170–0
	29138	2	14,0–15,6	80	359–0
	29139	1	11,5	110D	200–0
	29141	1	12,5	11	150–0
	29156	1	11,5	70D	200–0
	29175	1	23,3	143D	212–0
	29183	1	12,9	87S	45–0
Diaphus perspicillatus	28005	1	32,0	145	1129–0
	28028	2	19,6–29,9	153	664–0
	28298	1	21,9	173	683–0
	28299	1	21,6	183	474–0
	28300	1	24,6	171	792–0
	29190	3	14,0–17,3	169D	212–0
	29197	3	11,3–16,3	143S	50–0
Diaphus problematicus	28024	1	55,8	126	464–0
Diaphus richardsoni	28025	1	44,8	132	830–0
	28319	1	11,3	190	658–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Diaphus richardsoni (contd.)	28376	1	20,4	187	982–0
	29140	1	9,7	146D	212–0
Diaphus splendidus	27512	1	29,9	56	397–0
	28026	1	59,5	132	830–0
	29179	2	20,6–21,3	118D	212—0
	29181	1	19,3	110D	200–0
	29186	1	23,0	13	274–0
Diaphus sp.	28027	1	19,6	139	250–0
	28301	3	12,6–16,4	168	816–0
	29189	1	11,2	54S	45–0
	29191	3	8,3–10,3	118D	212–0
	29192	1	11,6	143D	212–0
	29193	1	8,4	87D	200–0
	29194	1	9,8	54D	200–0
	29195	1	8,9	95D	200—0
	29196	3	10,2–12,0	188D	212–0
	29198	4	8,2–10,4	124D	212–0
Diogenichthys atlanticus	28336	1	19,7	171	792–0
	28337	2	13,8–17,7	168	816–0
	28699	1	14,2	218	916–0
	29117	1	13,8	222D	193–0
Diogenichthys panurgus	28030	1	14,3	125	415–0
	28031	1	18,7	139	250–0
	28032	1	19,4	148	750–0
	28033	1	12,4	157	750–0
	28336	1	18,8	191	542–0
	29043	1	12,1	143S	50–0
	29056	1	10,8	152D	212–0
	29065	2	17,4–17,7	136D	212–0
	29066	1	17,0	20	528–0
	29079	1	10,4	104D	200–0
	29082	1	18,7	143D	212—0
	29103	1	10,3	249S	53–0
	29120	1	10,6	196D	212–0
	29129	2	10,6–11,5	188D	212–0
Gonichthys barnesi	28314	1	39,7	188N	0
	28671	1	41,7	196N	0
Hygophum hanseni	28331	1	37,1	173	683–0
	28334	1	28,0	174	760–0
	28338	2	27,6–34,3	168	816–0
	28355	1	28,4	160	583–0
	28683	1	28,9	221	1170–0
Hygophum hygomii	27108	2	50,4–52,1	18	600–0
	28034	2	47,2–49,8	153	664–0
	28315	1	51,3	188N	0
	28339	1	12,3	168	816–0
	28340	1	13,3	168	816–0
	28374	1	12,9	170	708–0
	28646	2	55,0–56,0	204N	0
	28681	1	52,4	222N	0
	28694	1	47,0	198	0
	29063	2	50,3–52,4	155N	0
	29075	1	19,2	118D	212–0
	29106	3	13,3–14,1	249S	53–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Hygophum hygomii (contd.)	29108	1	13,1	222S	43–0
	29126	4	14,3–19,7	118N	0
	29153	1	15,0	13	274–0
	29159	1	12,3	19	226–0
Hygophum proximum	29095	1	11,0	143D	212–0
	29098	1	22,3	19	226–0
Lampadena luminosa	27518	1	24,8	112	488–0
	27527	1	23,0	105	775–0
Lampadena notialis	28035	1	24,7	148	750–0
	28368	1	25,1	191	542–0
	29160	1	17,0	45	500–0
Lampadena speculigera	28643	1	126,6	195	1050–0
Lampanyctus achirus	28375	1	71,2	187	982–0
	28647	1	124,4	221	1170–0
	28666	1	136,8	195	1050–0
	28699	1	91,0	195	1050–0
Lampanyctus alatus	27103	2	43,7–44,7	25	600–0
	27106	1	42,1	18	600–0
	27507	2	41,9–48,2	63	140–0
	27508	1	30,2	56	397–0
	27520	4	37,3–41,4	112	488–0
	27535	2	25,0–30,0	88	297–0
	27660	1	22,4	105	775–0
	27661	1	18,6	96	465–0
	28036	1	31,7	119	750–0
	28037	2	36,8–42,7	132	830–0
	28038	1	45,0	140	1120–0
	28039	1	35,6	145	1129–0
	28040	1	24,7	153	664–0
	28041	2	36,9–38,1	154	500–0
	28042	1	38,3	157	750–0
	28058	1	20,2	148	750–0
	28303	1	20,8	191	542–0
	28317	1	25,5	190	658–0
	28329	3	35,8–42,0	173	683–0
	28343	1	21,9	168	816–0
	28347	2	27,8–33,3	167	1091–0
	28364	1	22,0	159	690–0
	28377	1	36,4	187	982–0
	28656	3	38,8–50,1	220	1416–0
	28679	3	45,3–49,3	218	916–0
	28689	1	46,7	214	1390–0
	28690	1	50,0	221	1170–0
	29034	1	22,4	62D	209–0
	29045	1	21,1	124D	212–0
	29048	2	14,0–15,6	62D	209–0
	29058	1	20,5	152D	212–0
	29068	1	14,4	79D	200–0
	29077	1	19,5	80	350–0
	29084	1	22,8	95D	200–0
	29092	1	13,5	95D	200–0
	29096	1	16,6	87D	200–0
	29101	1	29,9	143D	212–0
	29107	1	13,4	222S	43–0
	29116	1	17,4	196D	212–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Lampanyctus alatus (contd.)	29158	2	36,5–37,0	34	212–0
	29166	1	18,0	143D	212–0
	29366	1	15,9	168	816–0
Lampanyctus ater	28044	1	105,4	148	750–0
Lampanyctus ?ater	27507	1	93,0	99	920–0
	28403	1	78,0	153	664–0
Lampanyctus australis	27112	1	101,0	7	840–0
	27539	1	101,8	83	810–0
	28045	2	88,9–90,3	132	830–0
	28046	1	101,8	138	830–0
	28047	3	42,0–98,0	148	750–0
	28048	1	97,5	153	664–0
	28061	1	63,5	148	750–0
	28325	1	38,2	173	683–0
	28326	5	52,3–101,4	173	683–0
	28348	3	41,9–48,9	167	1091–0
	28645	3	85,1–98,6	224	663–0
	28649	1	93,4	223	670–0
	28650	1	94,3	209	1260–0
	28651	1	83,7	220	1416–0
	28652	2	88,5–91,3	218	916–0
	28680	1	35,4	218	916–0
	28691	1	49,4	221	1170–0
	29371	1	34,0	154	500–0
Lampanyctus festivus	27534	2	59,4–72,6	56	397–0
	28686	1	31,6	218	916–0
Lampanyctus lepidolychnus	27095	2	89,8–92,1	18	600–0
	27096	1	73,6	5	450–0
	27111	2	101,8–104,6	33	400–0
	27519	1	35,6	112	488–0
	27521	3	73,8–97,2	63	140–0
	27532	1	104,1	111	514–0
	27533	2	93,4–97,5	56	397–0
	28049	1	97,7	126	464–0
	28050	1	95,0	132	830–0
	28051	2	81,4–105,5	138	830–0
	28052	6	34,4–95,0	148	750–0
	28053	9	33,7–90,1	153	664–0
	28054	10	30,3–101,6	154	500–0
	28055	2	36,2–42,8	157	750–0
	28107	2	76,4–89,6	140	1120–0
	28327	1	62,9	173	683–0
	28328	4	36,6–45,8	173	683–0
	28333	1	43,1	174	760–0
	28349	2	35,0–39,0	167	1091–0
	28353	2	36,7–79,4	186	583–0
	28354	1	36,3	182	1517–0
	28359	2	46,1–53,8	160	583–0
	28375	1	96,8	187	982–0
	28642	4	89,5–109,4	194	2166–0
	28653	2	97,2–101,5	218	916–0
	28654	3	84,7–101,6	209	1260–0
	28665	1	103,7	195	1050–0
	28667	1	92,1	209	1260–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Lampanyctus nobilis	28056	1	54,6	157	750–0
	28358	1	45,0	160	583–0
Lampanyctus pusillus	28057	1	24,9	119	750–0
	28059	1	29,5	132	830–0
	29046	1	29,7	124D	212–0
	29128	1	14,6	188D	212–0
Lampanyctus turneri	27510	1	20,1	56	397–0
	28062	3	42,4–54,5	148	750–0
	28063	1	39,8	119	750–0
	28064	1	57,3	125	415–0
	28065	1	60,5	140	1120–0
	28066	1	51,8	153	664–0
	28067	1	24,0	154	500–0
	28322	1	31,3	173	683–0
	28323	2	24,0–28,0	173	683–0
	28371	1	33,0	170	708–0
	29169	1	20,0	143D	212–0
Lampanyctus sp. A	28060	1	66,6	125	415–0
	28330	1	76,5	173	683–0
Lobianchia dofleini	27501	1	29,6	111	514–0
	27506	2	31,4–32,0	63	140–0
	28068	1	26,2	154	500–0
	28069	1	29,7	148	750–0
	28070	1	28,2	157	750–0
	28071	1	29,5	153	664–0
	28072	1	27,6	138	830–0
	28073	3	28,1–33,7	139	250–0
	28074	1	29,1	140	1120–0
	28350	3	22,0–31,3	183	474–0
	28357	1	30,0	160	583–0
	28372	1	26,8	170	708–0
	28700	1	35,5	199	250–0
	28750	1	34,1	197	150–0
	29097	1	28,2	45	212–0
Lobianchia gemellarii	28698	1	41,1	218	916–0
	29182	1	19,0	104D	200–0
Myctophum asperum	28075	1	26,0	154	500–0
	29072	1	20,6	95D	200–0
	29121	1	14,4	170N	0
	29130	2	14,3–14,6	188N	0
	29165	2	26,4–27,0	155N	0
	29167	1	19,9	95S	45–0
	29168	1	28,3	152N	0
Myctophum aurolaternatum	29030	1	59,3	155N	0
	29035	1	37,4	95N	0
	29038	1	40,2	124D	212–0
Myctophum nitidulum	27107	3	20,9–24,4	45	212–0
	28076	1	57,0	148	750–0
	28304	1	22,6	191	542–0
	28307	1	24,8	190	658–0
	28692	1	16,1	205	585–0
	28695	1	40,1	198N	0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Myctophum nitidulum (contd.)	28696	1	52,7	199N	0
	29044	3	14,7–25,9	95N	0
	29059	3	15,4–23,8	124N	0
	29061	1	17,1	62N	0
	29076	4	16,4–32,3	155N	0
	29083	1	16,1	198	0
	29090	1	21,8	110N	0
	29102	2	28,6–29,9	152N	0
	29112	1	26,5	160N	0
Myctophum obtusirostre	28310	1	35,8	170N	0
	29099	1	67,9	152N	0
	29170	3	14,4–15,4	152N	0
	29215	1	14,6	188N	0
Myctophum phengodes	27516	1	28,7	112	488–0
	28305	2	26,5–36,9	191	542–0
	28313	1	51,0	188N	0
	28682	1	44,6	222N	0
	28697	1	45,7	223	670–0
	29801	1	39,0	110N	0
Myctophum spinosum	28077	1	58,6	153	664–0
	28311	1	32,8	170N	0
	28670	1	54,9	196N	0
	28688	1	53,4	222N	0
	29053	1	22,1	62N	0
	29071	1	14,4	104D	200–0
	29105	1	16,2	$170N_2$	0
	29118	1	24,7	$170N_1$	0
	29132	3	15,5–23,8	188N	0
	29147	1	30,2	124N	0
	29164	4	20,0–48,1	155N	0
Notolychnus valdiviae	28078	3	11,6–17,8	125	415–0
	28079	4	18,4–19,6	119	750–0
	28080	1	19,6	139	250–0
	28320	1	17,0	190	658–0
	28335	1	20,6	171	792–0
	28344	2	20,7–20,8	168	816–0
	28345	1	18,6	107	1200–0
	28356	1	19,1	160	583–0
	28367	1	20,6	191	542–0
	28373	1	18,1	170	708–0
	29031	3	11,9–17,4	124D	212–0
	29033	3	11,4–18,5	110D	200–0
	29050	3	10,3–18,0	152D	212–0
	29051	2	12,6–17,4	62D	209–0
	29057	1	17,8	118D	212–0
	29067	1	9,6	95D	200–0
	29074	1	18,6	11	150–0
	29080	1	9,9	45	212–0
	29086	3	12,1–16,0	104D	200–0
	29088	3	15,2–15,9	45	212–0
	29094	1	11,2	70D	200–0
	29100	1	19,6	143D	212–0
	29122	1	11,6	169D	212–0
	29144	1	13,0	95S	45–0
	29162	1	16,4	54D	200–0

	SAM No.	No.	SL (mm)	SM station	Depth (m)
Notoscopelus caudispinosus	28362	3	17,8–19,6	159	690–0
	29110	1	20,4	189D	212–0
Notoscopelus resplendens	27528	1	61,7	105	775–0
	28081	2	56,2–60,1	148	750–0
	28082	1	48,6	154	500–0
Scopelopsis multipunctatus	27097	3	48,6–60,9	18	600–0
	27098	11	49,1–65,8	47	400–0
	27099	5	47,9–61,0	5	450–0
	27100	3	50,1–54,6	25	600–0
	27114	1	49,1	33	400–0
	27124	1	65,1	49	400–0
	27513	2	52,8–55,0	112	488–0
	28083	1	54,6	145	1129–0
	28084	4	49,8–51,6	139	250–0
	28085	2	50,1–51,1	148	750–0
	28086	1	50,2	153	664–0
	28321	1	46,1	190	658–0
	28657	1	61,0	224	663–0
	28658	1	51,5	253	1010–0
	28659	1	54,0	197	150–0
	28660	1	51,6	209	1260–0
	28661	1	55,1	194	2166–0
	28662	1	58,0	220	1416–0
	28663	1	61,4	218	916–0
	28664	4	51,0–62,6	199	250–0
	28668	4	47,9–58,4	208	1320–0
	29114	2	51,9–52,8	244D	172–0
	29123	1	15,5	222D	193–0
Symbolophorus barnardi	27126	1	53,7	49	400–0
	27531	1	92,7	105	775–0
	27540	1	97,3	63N	0
	28370	1	49,3	170N	0
	28644	1	88,5	192	0
	28648	1	84,8	209	1260–0
Symbolophorus evermanni	27541	1	59,1	63	140–0
	28087	2	35,3–56,6	148	750–0
	28088	1	34,5	153	664–0
	28687	1	29,6	210N	0
	29047	1	18,4	62D	209–0
	29073	1	20,2	110N	0
	29087	2	19,8–20,3	198	0
	29104	3	18,3–19,3	$170N_2$	0
	29109	1	19,2	196N	0
	29111	1	18,9	210N	0
	29115	1	20,3	222N	0
	29119	2	17,7–18,4	$170N_1$	0
	29154	4	18,6–22,3	155N	0
	29163	1	25,5	54S	45–0
	29171	1	18,2	26	212–0
Taaningichthys bathyphilus	28089	1	51,3	138	830–0
	28090	1	55,0	157	750–0
	28677	1	51,0	218	916–0
Triphoturus nigrescens	28038	3	23,0–27,8	190	658–0
	28091	1	27,6	125	415–0

SAM No.	No.	SL (mm)	SM station	Depth (m)
28092	1	32,0	153	664–0
28093	3	28,3–30,1	148	750–0
28094	1	33,6	157	750–0
28324	1	30,9	173	683–0
28346	1	25,7	167	1091–0
29040	1	17,1	104D	200–0
29062	1	16,6	70D	200–0
29070	2	18,3–29,7	143D	212–0
29146	1	13,5	80	359–0
29365	1	27,0	62S	45–0

SYSTEMATIC ACCOUNT

Benthosema fibulatum (Gilbert & Cramer, 1897)

Fig. 3

Remarks

A single specimen (SAM–27462), taken at 42°11′S 19°26′E, was previously recorded from the southern African region (Wisner 1976). The *Meiring Naude* specimens, all immature (female stage I) and taken in Bongo nets between 200 m and the surface at sundown from the region of 27°S, were caught during the 1976 cruise only. Surface temperatures ranged above 25 °C at these stations, and water of an equivalent temperature was found at least to a depth of 75 m, with a minimum temperature of 14,18 °C at maximum trawling depth. This would suggest that the species probably penetrates the region with the Agulhas Current and does not breed in southern African waters.

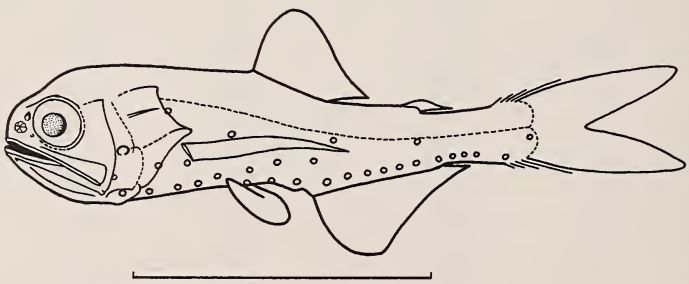

Fig. 3. *Benthosema fibulatum* (A 2957). Scale 10 mm.

Benthosema suborbitale (Gilbert, 1913)

Remarks

Hulley (1981) reports that the distribution of the species in the Atlantic is related to the 15 °C isotherm at 200 m. During the *Meiring Naude* cruises, specimens were taken at seven stations at which the temperature at 200 m was below

this value (minimum value 12,84 °C) but, in all cases, warm water with a minimum value of 15,5 °C occurred in the upper 100 m. The species was taken in the upper 50 m on two occasions and juvenile specimens (less than 12 mm) in the upper 45 m. Sexually mature specimens (female stage V) were present in the material.

Bolinichthys indicus (Nafpaktitis & Nafpaktitis, 1969)

Fig. 4

Remarks

The specimens have been tentatively referred to *B. indicus* solely on the basis of their geographic distribution. Although Nafpaktitis & Nafpaktitis (1969) have given characteristics for the separation of *B. indicus* and *B. longipes*, these are not satisfactory diagnostics in the case of the *Meiring Naude* material. All specimens, except for two females (Fig. 4) from each of stations SM 140 and SM 145, are characterized by a low GR count (less than 17) typical of *B. indicus*. However, a luminous patch above the pectoral fin may be present or absent; luminous scales at the dorsal base vary between 0 and 2, and at the anal base between 1 and 2; the length of the infracaudal gland as a percentage of CPD varies between 50,0 and 88,5 % (mean 65,4 %), and the supracaudal gland as a percentage of the infracaudal gland between 43,5 and 87,5 % (mean 70,0 %); and the infracaudal gland reaches the last AOp in only 50 % of the specimens. The two female specimens (GR 17) fall within the range of overlap of the two species in this diagnostic. In these specimens, the luminous patch above the pectoral fin is absent, there are 2–3 scales at the dorsal base and a single scale at the anal base; the infracaudal length varies between 50,7 and 52,4 % CPD and the supracaudal between 72,7 and 77,3 % of infracaudal length; and the infracaudal gland does not reach the last AOp. This, together with the fact

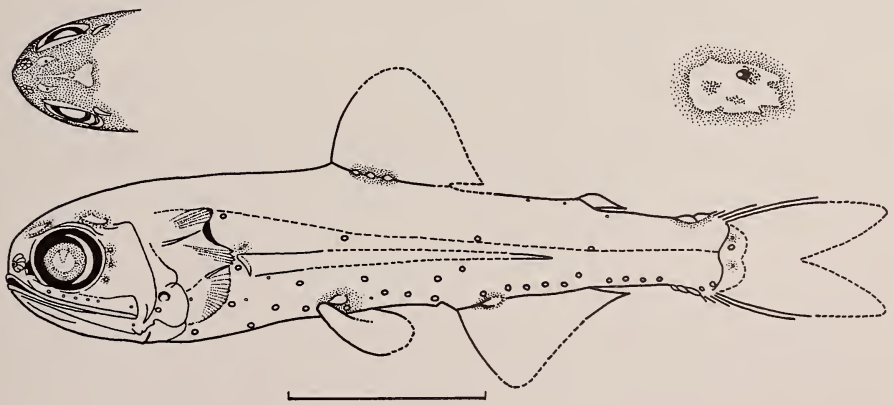

Fig. 4. *Bolinichthys indicus* (SM 140), with dorsal view of head and right supraorbital luminous patch. Scale 10 mm.

that *B. indicus* and *B. longipes* were never taken at the same station during the R.V. *Anton Bruun* cruises, particularly between 10°N and 20°S (Nafpaktitis & Nafpaktitis 1969), suggests that the taxonomic status of the two species should be more fully investigated.

Bolinichthys supralateralis (Parr, 1928)

Remarks

No sexually mature specimens were taken during the *Meiring Naude* cruises.

Ceratoscopelus warmingii (Lütken, 1892)

Remarks

Immature specimens only occur in the *Meiring Naude* material (stages I–III), but there are females with well-developed ovaries (stage IV) from west of Slangkop Lighthouse and from 36°47′S 34°40′E in the SAM collection.

Diaphus aliciae Fowler, 1934
Fig. 5

Diaphus aliciae Fowler, 1934: 295, fig. 53 (between Bohol and Leyte, Philippines). Nafpaktitis, 1978: 73, figs 72–74.

Description

D 14; A 13; P 10; AO 5+4, total 9; GR 5+1+11, total 17.

Measurements (% SL): BD 24,8–25,6; HD 23,3–23,6; UJ 18,5–20,2; ED 10,2–10,9; CPD 9,9–10,5; CPL 20,9–21,3.

Posterodorsal margin of operculum more or less angulate. Origin of dorsal fin about above ventral base. Pectoral fins damaged, ventral fins reaching to origin of anal fin or slightly beyond. Origin of anal fin posterior to vertical through base of last dorsal ray. Origin of adipose fin slightly anterior to vertical through base of last anal ray. Gill rakers lath-like. Dorsal base shorter than length of upper jaw and longer than anal base.

Dn about size of nasal rosette, in deep recess and directed anteriorly. Vn short, less than distance between it and So. So small, slightly posterior to vertical through centre of pupil. Op_1 opposite posterior end of upper jaw; Op_2 about size of general body photophore, situated below level of ventral margin of orbit. PLO 1,5 times nearer to upper pectoral base than to lateral line and associated with a small, luminous scale. PO_1, PVO_1, PVO_2 in same straight, oblique line, with PVO_2 at lower end of base of pectoral fin. PO_1–PO_2 interspace greater than PO_2–PO_3 and PO_3–PO_5 interspaces, with PO_4 slightly posterior to vertical through PO_3, and PO_5 elevated and anterior to outermost ray of ventral fin. VLO about midway between base of ventral fin and lateral line. VO_1–VO_3 on same straight, oblique line. SAO slightly angulate; with SAO_1 above anus and at about level of VO_3, with SAO_2 immediately behind SAO_1 and above level of VO_3, and with SAO_3 about above anal origin and about 1,5–2,0 times its di-

ameter below lateral line. AO series about one photopore diameter apart, with AOa^1 elevated, and with all AOp behind anal base. Pol under base of adipose fin, about 1,5 times its diameter below lateral line. Prc curved; Prc_4 about 1,5 times its diameter below level of lateral line.

Maximum length 60 mm; sexually mature from about 45 mm. Indian Ocean specimens smaller—maximum length 39 mm and sexually mature from about 35 mm.

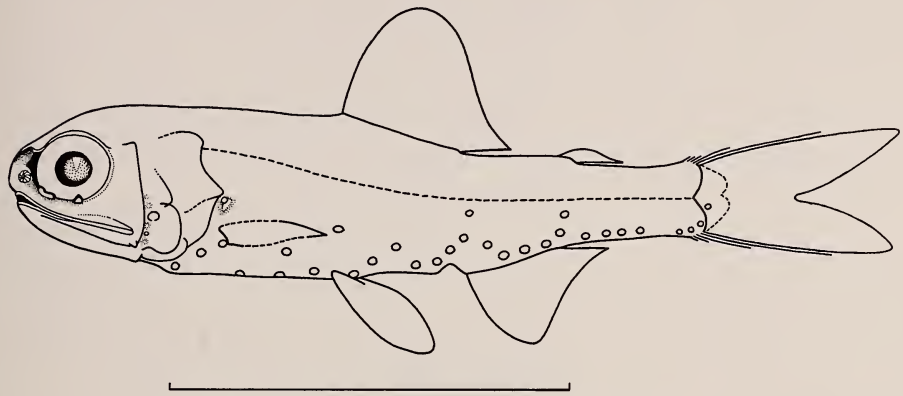

Fig. 5. *Diaphus aliciae* (SM 174). Scale 10 mm.

Distribution

Indian Ocean and south-eastern Asian seas: west of 70°E between 10°N and 12°S, east of 85°E between 05°N and 09°S. Pacific Ocean: off northern Kyushu.

Remarks

The *Meiring Naude* specimens, both of which are immature, represent the first record of the species in the southern African region.

Diaphus brachycephalus Tåning, 1928

Remarks

No sexually mature adults were present in the *Meiring Naude* material, but stage IV females are known to at least 37°S in the region.

Diaphus dilemmatus Tåning, 1932

Remarks

This is one of the most common species of *Diaphus* off the east coast of South Africa. A single, sexually mature female (stage V, 28,8 mm) was taken by the *Meiring Naude* (SM 112), but stage IV females were taken as far south as 31°S. This, coupled with the fact that sexually mature adults are found in the

eastern South Atlantic and the fact that there are no statistically valid differences in meristics between these specimens and those from the western South Indian Ocean (D: t −0,40; df 52; A: t 1,84; df 54; P: t −1,18; df 26; AOa: t −0,15; df 98; AOp: t 3,16; df 97; AO_T: t 2,99; df 97; GR_u: t 2,87; df 67; GR_l: t 1,27; df 67; GR_T: t 2,50; df 67), confirms that a single population is involved. The Vn in males is horizontally striated in the *Meiring Naude* specimens, as pointed out by Nafpaktitis (1978) for the western Indian Ocean population.

Diaphus effulgens (Goode & Bean, 1896)

Remarks

Analysis of GR counts between specimens of this species from the South Atlantic and those taken by the *Meiring Naude* in the western South Indian Ocean reveals significant differences only in GR_u count (t 4,23; df 59), with higher values for the South Atlantic specimens.

Diaphus garmani Gilbert, 1906

Remarks

All specimens taken by the *Meiring Naude* are immature.

Diaphus hudsoni Zubrigg & Scott, 1976

Remarks

Nafpaktitis (1978) has suggested that the apparent absence of the species in the Indian Ocean may be due to inadequate sampling. Grindley & Penrith (1965) reported specimens of this species from off Cape Agulhas as *D. theta* (IK 38, IK 39, IK 40). The two *Meiring Naude* specimens were taken at 30°49′S 30°35′E and 34°06′S 27°08′E, where the temperature at 200 m was 14,18 °C, and 14,60 °C respectively. The species may extend northwards in this region to 26°40′S since two specimens (45–47 mm), identified as *Diaphus richardsoni* by Grindley & Penrith (1965), proved on re-examination to be specimens of *D. hudsoni*. This northern limit in the western South Indian Ocean is farther to the north of that for the species in the eastern South Atlantic, outside the Benguela Upwelling Region (Hulley 1981), and would support both Heydorn's (1976) and Carter's (1977) findings on the northern transport of the biota in association with the northward advection of pockets of cooler water. Carter (1977, figs 40–43) demonstrates that in the region north of 28°S, the 15°C isotherm varies between 60 m and 140 m, inshore of the Agulhas Current core.

Diaphus jenseni Tåning, 1928

Fig. 6

Diaphus jenseni Tåning, 1928: 141, fig. 14 (03°18′N 129°02′E). Nafpaktitis, 1973: 24, fig. 22; 1978: 21, figs 18–19. Wisner, 1976: 112, fig. 101. Parin *et al.*, 1977: 117, fig. 18. Kawaguchi & Shimizu, 1978: 110, figs 42–43. Kotthaus, 1979: 51, figs 509, 514.
Diaphus kylei Tåning, 1932: 133, fig. 5 (07°22′N 121°16′E). Nafpaktitis, 1973: 20, fig. 17.
Diaphus gudgeri Fowler, 1934: 302, fig. 59 (northern Mindanao, Philippines).
Diaphus carlsoni Fowler, 1934: 312, fig. 67 (12°38′30″N 121°37′30″E).

Description

D 15; A 14; P 11; AO 6+5, total 11; GR 6+1+12, total 19.

Origin of dorsal fin slightly in advance of base of ventral fin. Origin of anal fin behind vertical through base of last dorsal ray. Origin of adipose fin slightly behind vertical through base of last anal ray. Pectoral fin not reaching base of ventral fin; ventral fin not reaching anal origin.

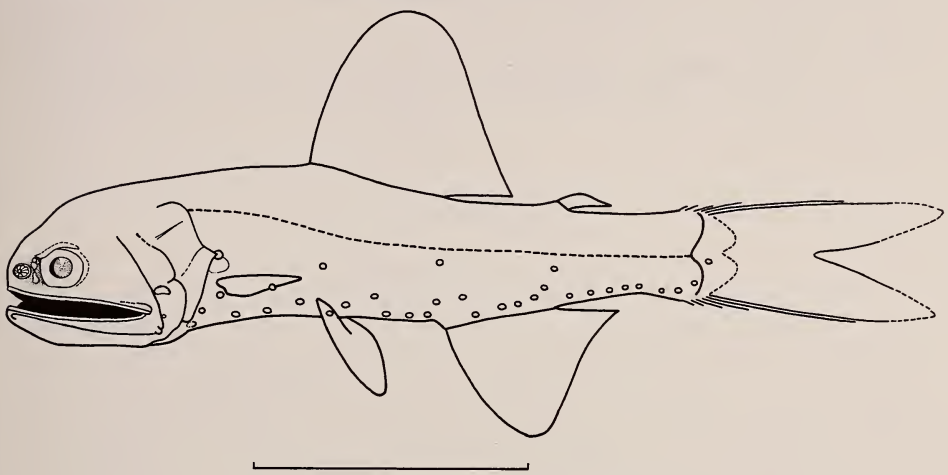

Fig. 6. *Diaphus jenseni* (SM 183). Scale 10 mm.

Dn small, heart-shaped and directed anterolaterally; Vn about same size as Dn, situated at anteroventral margin of orbit. Ant present, dorsad to Dn. Op_1 small and about opposite posterior end of maxilla; Op_2 larger than general body photophore, situated above Op_1 and at about level of ventral margin of orbit. PLO much nearer to upper base of pectoral fin than to lateral line. VLO about equidistant between outer base of ventral fin and lateral line. SAO series slightly angulate, with SAO_1 in line with VO_4 and VO_5, but well behind VO_5, with SAO_2 above anus at about level of VO_2, and with SAO_3 slightly behind vertical through SAO_2 and about 1,5 times its diameter below lateral line. AOa^1 abruptly elevated, above level of SAO_2; AOa^2–AOa^3 interspace enlarged; no AOp photophores above base of anal. Pol under origin of adipose fin, about 1,5 times its diameter below lateral line. Prc series arched, with Prc_3–Prc_4 interspace enlarged; Prc_4 about its own diameter below level of lateral line. A large luminous scale at PLO.

Maximum length 50 mm; sexually mature from about 31 mm.

Distribution

Indian Ocean: between 05°N and 12°S, but more common west of 75°E; south-east Asian seas. Pacific Ocean: central and western tropical waters to about 35°N in Kuroshio Current.

Remarks

The single, small, immature female (stage I, 26,6 mm), taken during the *Meiring Naude* cruises at 33°48,8′S 27°47,9′E, represents the first record of the species in the southern African region.

Diaphus luetkeni (Brauer, 1904)

Remarks

Although no sexually mature females were taken during the *Meiring Naude* cruises, stage IV females are known from as far south as 34°S off the east coast of South Africa.

Diaphus metopoclampus (Cocco, 1829)

Remarks

All female specimens taken during the *Meiring Naude* cruises were immature, but stage IV females are known from 25°55′S 39°30′E. The *Meiring Naude* specimens showed both subdivided and continuous Vn organs, but in all cases the PLO was nearer to the lateral line. Hulley (1981) has pointed out that GR_u counts in specimens from the North Atlantic tend to be higher than those from the South Atlantic. A comparison of this count between specimens from the western South Indian Ocean and those from the North Atlantic revealed a significant difference (t −4,20; df 58), while differences in GR_u count between specimens from the western South Indian Ocean and those from the South Atlantic were insignificant (t −2,38; df 85).

Diaphus mollis Tåning, 1928

Remarks

Hulley (1981) has pointed out that in the Atlantic the species apparently does not reach sexual maturity south of about 36°S (western sector) and about 25°S (eastern sector). SAM data indicate that sexually mature females (stage V) have been taken at 26°40′S 40°00′E, and stage IV females from as far south as 37°30′S in the region of 40°E.

Diaphus nielseni Nafpaktitis, 1978

Fig. 7

Diaphus nielseni Nafpaktitis, 1978: 17, figs 12–13 (06°37′N 122°24′E). Gjøsaeter & Beck, 1981: 257, 259, fig. 4.

Description

D 15 (14); A 14 (13); P 10; AO 6+5, total 11; GR 6+1+14, total 21.

Origin of dorsal fin about above base of ventral fin. Origin of anal fin behind end of base of dorsal fin. Origin of adipose fin on vertical through base of

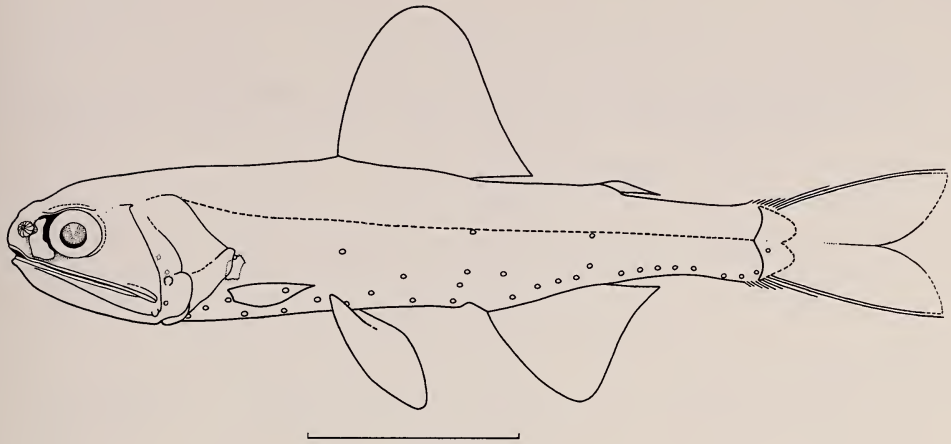

Fig. 7. *Diaphus nielseni* (SM 148). Scale 10 mm.

last anal ray or slightly in front of this vertical. Pectoral fin not reaching ventral base; ventral fin extending almost to origin of anal fin.

Dn heart-shaped and directed anterolaterally, slightly larger than general body photophore; Vn continuous with Dn, expanded posteroventrad to nasal rosette and extending posteriorly to about middle of anterior rim of iris. PLO about 1,5 times nearer to upper base of pectoral fin than to lateral line. VLO slightly nearer to lateral line than to base of ventral fin. SAO series slightly angulate, with SAO_1 above level of VO_2 and just posterior to VO_5, with SAO_2 about above anus and behind line joining centres of SAO_1 and SAO_3, and with SAO_3 in advance of vertical through origin of anal fin and in contact with lateral line. AOa^1 abruptly and highly elevated to about level of SAO_2; AOa^2–AOa^3 interspace enlarged; last AOa elevated; AOp behind end of base of anal fin, evenly spaced and level. Pol slighly in advance of origin of adipose fin and in contact with lateral line. Prc series widely spaced, with Prc_3–Prc_4 interspace subequal to AOp–Prc_1 interspace; Prc_4 about one photophore diameter below level of lateral line. A large, luminous scale at PLO.

Maximum length 40 mm; sexually mature from about 32 mm.

Distribution

High-oceanic, mesopelagic. Indian Ocean: Equatorial waters west of Sumatra; off east coast of Africa and in Mozambique Channel between 15°S and 21°S. Pacific: south-eastern Asian seas, northward to southern Japan.

Remarks

The *Meiring Naude* specimens represent the first record of the species in the southern African region, where there is a range extension to about 30°S. The three specimens are all immature.

Diaphus parri Tåning, 1932

Remarks

No sexually mature specimens were taken by the *Meiring Naude*.

Diaphus perspicillatus (Ogilby, 1898)

Remarks

No sexually mature specimens were taken by the *Meiring Naude*.

Diaphus problematicus Parr, 1928

Remarks

The single male specimen taken by the *Meiring Naude* represents a range extension to about 30°S in the western South Indian Ocean.

Diaphus splendidus (Brauer, 1904)

Remarks

No sexually mature specimens were taken by the *Meiring Naude*. The species is now known to extend southward to about 31°S off the east coast of South Africa.

Diogenichthys atlanticus (Tåning, 1928)

Fig. 8

Remarks

One female specimen (17,7 mm, stage IV) was taken by the *Meiring Naude*. *D. atlanticus* appears to be less common than *D. panurgus* off the South African east coast; the two species were however taken in the same hauls during the sampling.

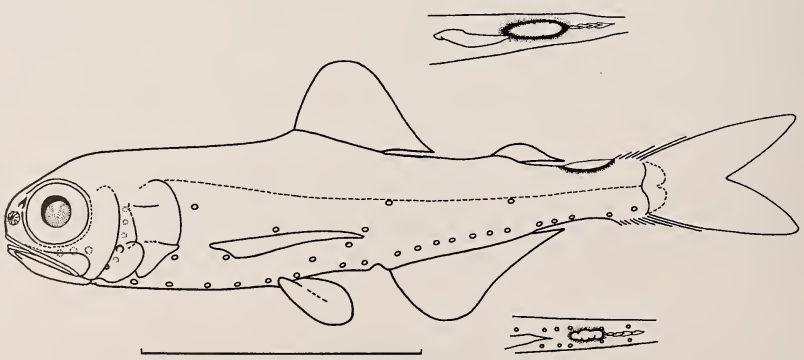

Fig. 8. *Diogenichthys atlanticus* (A 3634), with dorsal view of supracaudal luminous gland (♂) and ventral view of infracaudal luminous gland (♀). Scale 10 mm.

Diogenichthys panurgus Bolin, 1946

Fig. 9

Diogenichthys panurgus Bolin, 1946: 140 (05°56'N 76°22'E). Nafpaktitis & Nafpaktitis, 1969: 14, figs 13–15. Kotthaus, 1972*b*: 15, figs 264, 282. Wisner, 1976: 47. Parin *et al.*, 1977: 109, fig. 15.

Description

D 12 (rarely 10); A 16 (15, rarely 17); P 11 (10); AO 6 (5–7) + 3 (2), total 8–9 (10); GR 2 + 1 + 8–9, total 11–12. One specimen with GR 3 + 1 + 10, total 14 (left side), GR 2 + 1 + 9, total 12 (right side).

UJ 4,9–7,1 (mean 5,8) in SL; UJ 1,5–2,2 (mean 1,8) in HL.

Origin of dorsal fin behind vertical through ventral base; origin of anal fin on or in advance of vertical through base of last dorsal ray. Adipose origin well in advance of vertical through base of last anal ray. Pectoral fin extending to about anal origin; ventral fin extending to about VO_4.

Dn present, sexually dimorphic in mature males; Vn absent. Op_1 small, opposite expanded posterior margin of maxilla; Op_2 somewhat posterior to Op_1, below level of ventral margin of orbit. 5 PO, evenly spaced and level. PVO_1 about above PO_2–PO_3 interspace and slightly below level of PVO_2, which is at lower base of pectoral fin. PLO about midway between upper pectoral base and lateral line. 4 VO, evenly spaced, with VO_2 elevated. VLO slightly in advance of vertical through VO_1 and at about level of upper pectoral base. SAO series straight or slightly curved, with SAO_1 on or behind vertical through VO_4 and slightly below level of VLO, with SAO_2 above anus, and with SAO_3 behind vertical through anal origin and in contact with lateral line. AO level; no AOp

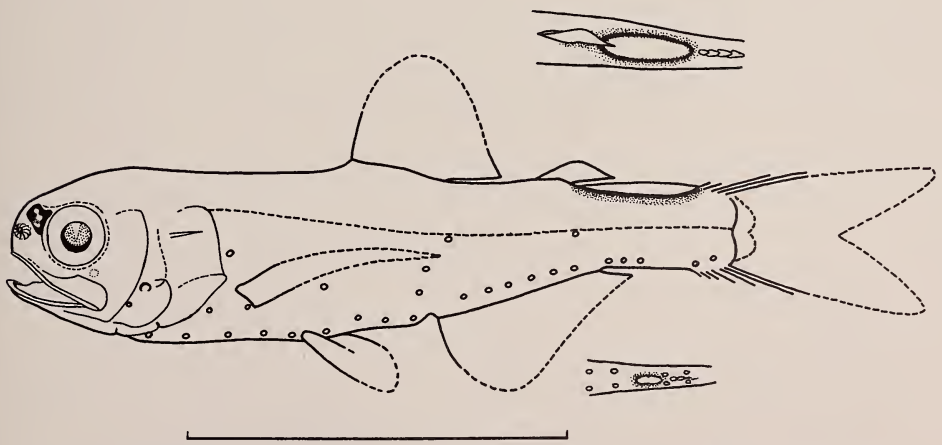

Fig. 9. *Diogenichthys panurgus* (SM 143D), with dorsal view of supracaudal luminous gland (♂) and ventral view of infracaudal luminous gland (♀). Scale 10 mm.

photophores above anal base. Pol well behind vertical through adipose origin and in contact with lateral line. Prc_2 slightly raised; Prc_1–Prc_2 interspace less than one-half distance AOp–Prc_1.

Mature males with single supracaudal gland only, extending from procurrent caudal rays almost to adipose base; females with infracaudal gland only, consisting of one coalesced or two partially-coalesced luminous patches.

Maximum length 23 mm; sexually mature from about 19 mm.

Distribution

High-oceanic, mesopelagic. Indian Ocean: 19°N to 05°S.

Remarks

The diagnostics of UJ in HL and in SL, as given by Nafpaktitis & Nafpaktitis (1969), do not appear to be valid in the *Meiring Naude* specimens. However, they have been identified as *D. panurgus* on the basis of GR count and the characters given by Kotthaus (1972*b*). As such, the specimens represent the first record of the species from the southern African region. During the cruises, the species was taken south to about 34°S, but additional SAM material suggests that it is found to as far south as 37°45′S in the region. Females with developing ovaries (stage III) have been taken to 31°S. The least depth of capture was 50–0 m.

Gonichthys barnesi Whitley, 1943

Remarks

Andriashev (1962) and Hulley (1981) have indicated that *G. barnesi* is taken in waters whose surface temperatures vary between 16 °C and 22 °C. The two *Meiring Naude* specimens were taken at the surface in temperatures of 23,03 °C and 23,68 °C. The single female (stage IV) was caught at 31°34′S.

Hygophum hanseni (Tåning, 1928)

Remarks

No sexually mature females were taken during the *Meiring Naude* cruises.

Hygophum hygomii (Lütken, 1892)

Remarks

Hulley (1981) recognizes two populations (northern and southern) in the Atlantic Ocean. There are no significant differences in meristics between specimens from the *Meiring Naude* cruises and those from the South Atlantic. As is the case with the latter, *Meiring Naude* specimens are significantly different to specimens from the North Atlantic in GR_I (t 5,89; df 128) and GR_T (t 6,23; df 128) counts. Stage V females were taken during the *Meiring Naude* cruises.

Hygophum proximum Bekker, 1965

Fig. 10

Myctophum (Myctophum) benoiti reinhardti Brauer, 1906: 185, fig. 97 (*partim*).
Hygophum reinhardtii (*non* Lütken) Sarenas, 1954: 418, fig. 12.
Hygophum benoiti (*non* Cocco) Blache, 1962: 33 (*partim*).
Hygophum proximum Bekker, 1965: 81, figs 6–9 (00°58′S 82°53′E). Nafpaktitis & Nafpaktitis, 1969: 17, figs 16–17. Kotthaus, 1972*b*: 16, figs 265, 268, pl. 1 (4). Parin *et al.*, 1977: 109, fig. 16. Gjøsaeter, 1981: 220.
Hygophum reinhardti (*non* Lütken) Grindley & Penrith, 1965: 282.

Description

D 14; A 19–20; P 13–14; AO 4–5+7, total 11–12; GR 4+1+13, total 18.

Origin of dorsal fin on vertical through outer ventral base; origin of anal fin on or slightly behind vertical through base of last dorsal ray. Origin of adipose fin well in advance of vertical through base of last anal ray. Pectoral fin extending to about anal origin; ventral fin reaching anal origin.

Dn and Vn present; small, luminous organ at posterior end of supraorbital ridge, slightly in advance of posterior margin of orbit. Op_1 opposite expanded posterior margin of maxilla; Op_2 about level of ventral margin of eye. 5 PO, level. PVO_1 in advance of vertical through PO_2, closer to level of ventral base of pectoral fin than to ventral profile; PVO_2 at lower base of pectoral fin. PLO midway between upper pectoral base and lateral line. VLO above outer base of ventral fin, closer to lateral line than to ventral base. 4 VO, level. SAO series obtusely angulate, with SAO_1 on or slightly in advance of vertical through VO_3, with SAO_2 about above anus; and with SAO_3 above origin of anal fin, in contact with lateral line. AOa and AOp level. 2 Pol with Pol_1 above last AOa and with Pol_2 well in advance of vertical through adipose origin. 2 Prc widely separated, with Prc_2 in contact with or less than one photophore diameter below lateral line.

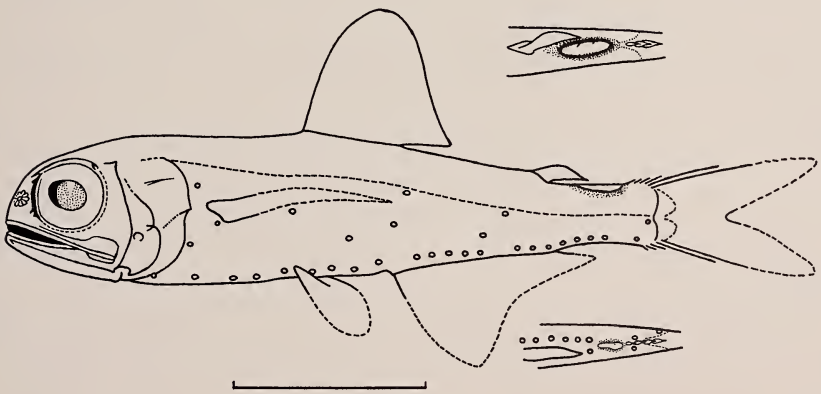

Fig. 10. *Hygophum proximum* (IK 35), with dorsal view of supracaudal luminous gland (♂) and ventral view of infracaudal luminous gland (♀). Scale 10 mm.

Males with single, black-edged supracaudal gland only; females with single infracaudal gland only.

Maximum length about 50 mm.

Distribution

High-oceanic, mesopelagic; nyctoepipelagic at the surface. Indian Ocean: 25°N to 10°S. Pacific Ocean: 24°N to 24°S (eastern sector).

Remarks

While the two *Meiring Naude* specimens (both immature) represent the first record of the species in the southern African region, specimens identified by Grindley & Penrith (1965) as *H. reinhardti* proved on re-examination to be *H. proximum*.

Lampadena luminosa (Garman, 1899)

Remarks

Both *Meiring Naude* specimens are immature.

Lampanyctus achirus Andriashev, 1962

Fig. 11

Lampanyctus ater (*non* Tåning) Norman, 1930: 331.
Lampanyctus achirus Andriashev, 1962: 256, fig. 27 (64°36′S 108°52′W). Nafpaktitis & Nafpaktitis, 1969: 54, figs 54–55 (*partim*). McGinnis, 1974: 143, fig. 34. Wisner, 1976: 176, figs 165–166 (*partim*). Hulley, 1981: 182, fig. 84.
[Non] Lampanyctus cf. *achirus*: Hulley, 1972: 225 (= *Lampanyctus* sp. B).

Description

D 15 (14); A 18 (17); AO 6–8 + 8 (7–9), total 14–16; GR (first arch) 5–6 + 1 + 12, total 18–19; GR_l (second arch) 1, x–xi; Ll 34–36.

Origin of dorsal fin well behind vertical through outer ventral base, with

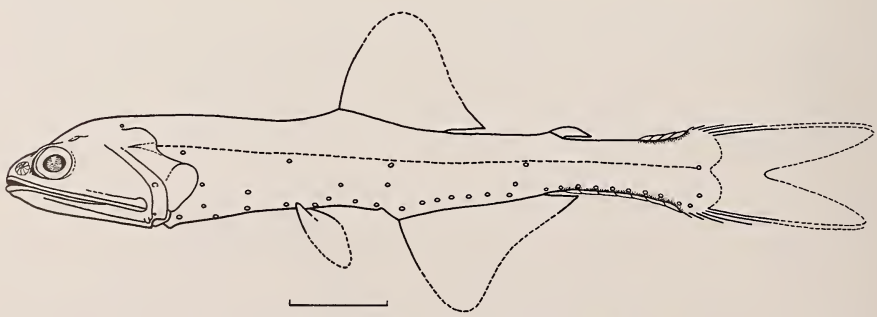

Fig. 11. *Lampanyctus achirus* (SM 187). Scale 10 mm.

Pre D 46–48% SL (mean 46,8 %); origin of anal fin about under middle of dorsal fin. Origin of adipose fin on or slightly behind vertical through last anal ray. Pectoral fins absent; ventral fins extending to about anus.

Dn absent; Vn small. Op_1 minute, at level of posterior margin of maxilla; Op_2 above Op_1, below level of ventral margin of eye. 5 PO, with PO_4 elevated and in front of, on or behind vertical through PO_3. PVO_1 midway between PO_1 and PO_2, or nearer PO_2 and at about level of posterior end of maxilla; PVO_2 about one photophore diameter below lateral line. VLO above outer ventral base or slightly in front, about one photophore diameter below lateral line. 4 VO, slightly arched, but VO_2 not anteriorly displaced to above VO_1; VO_1–VO_2 interspace shorter than rest of series. SAO series angulate, with SAO_1 above VO_2–VO_3 interspace and at about level of PO_4; with SAO_2 above anus or above origin of anal fin, equidistant between VO_4 and AOa^1, or closer to VO_4, and with SAO_3 at or slightly below lateral line. AO series straight or slightly arched, with AOa^1–AOa^2 interspace somewhat larger than interspaces of rest of series; AOp evenly spaced and level, no photophores above anal base. Pol_1 slightly behind vertical through last AOa; Pol_2 in advance of vertical through origin of adipose fin. 4 Prc, arched and with concavity directed anterodorsally; Prc_1 and Prc_2 level, or with Prc_2 lower; Prc_3 almost directly below Prc_4, which is situated at level of lateral line or above level.

Supracaudal gland consisting of 3–4 overlapping scales; infracaudal gland consisting of 7–8 overlapping scales, the first often separated from the rest of the series, extending 79–91% (mean 84,2%) of distance between procurrent caudal rays and base of last anal ray.

Maximum length 162 mm; sexually mature from about 133 mm.

Remarks

See under *Lampanyctus* sp. A (p. 83).

Lampanyctus ater Tåning, 1928

Fig. 12

Lampanyctus ater Tåning, 1928: 68 (24°30'N 80°00'W). Nafpaktitis & Nafpaktitis, 1969: 44, figs 53–54. Hulley, 1972: 225; 1981: 188, fig. 87. Nafpaktitis, 1973: 38, fig. 36. Wisner, 1976: 175, fig. 164. Nafpaktitis *et al.*, 1977: 203, figs 139, 141.
Lampanyctus niger (*non* Günther) Norman, 1930: 331 (*partim*). Fowler, 1936: 384 (*partim*).
Paralampanyctus ater Kotthaus, 1972*a*: 29, fig. 284, pl. 2 (12).

Description

D 15; A 19; AO 7+8, total 15; GR (first arch) 5+1+10, total 16; GR_1 (second arch) 1, ix; Ll 35–36.

Origin of dorsal fin well behind vertical through outer ventral base, with Pre D 46% SL; origin of anal fin below posterior third of dorsal fin. Origin of adi-

pose fin well in advance of vertical through last anal ray. Pectoral fin small, probably extending only to PO_3; ventral fin reaching to VO_4.

Dn absent; Vn small. Op_1 minute, below level of posterior end of maxilla; Op_2 in advance of Op_1, at level of ventral margin of orbit. 5 PO, with PO_4 elevated and slightly behind vertical through PO_3. PVO_1 above PO_1–PO_2 interspace, closer to PO_2 and at about level of posterior end of maxilla; PVO_2 at upper pectoral base, in advance of vertical through PVO_1. PLO about three

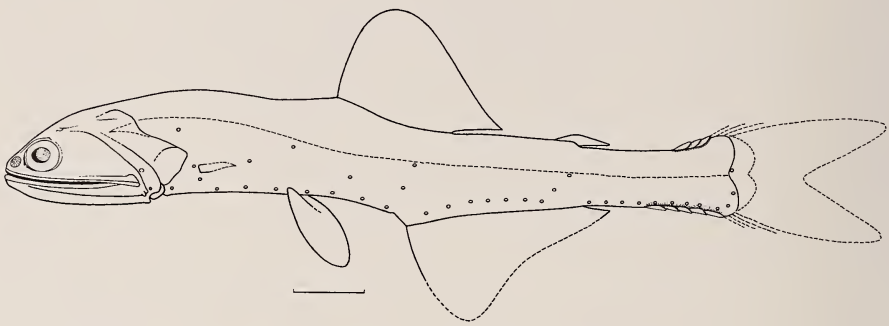

Fig. 12. *Lampanyctus ater* (SM 148). Scale 10 mm.

photophore diameters below lateral line. VLO above outer ventral base, about one photophore diameter below lateral line. 4 VO, evenly spaced and level. SAO series angulate, with SAO_1 midway between VO_2 and VO_3, with SAO_2 slightly in advance of anal origin, closer to VO_4 than AOa^1, and with SAO_3 behind origin of anal fin, in contact with lateral line. AOa more or less evenly spaced and slightly arched; AOp evenly spaced. Pol_1 behind vertical through last AOa; Pol_2 in contact with lateral line, behind vertical through adipose origin. Prc series arched, with concavity directed anterodorsally; with Prc_2 above level of Prc_1; with Prc_3 directly below Prc_4; and with Prc_4 above level of lateral line.

Supracaudal gland consisting of 3 overlapping scales; infracaudal gland consisting of 5 overlapping scales, extending 49% of distance between procurrent caudal rays and base of last anal ray.

Maximum length 129 mm; sexually mature from about 90 mm.

Distribution

High-oceanic, mesopelagic: day 680–1 200 m, exhibiting size stratification with depth; night 51–925 m, non-migrants all sizes. Atlantic Ocean: Subtropical Pattern (Bisubtropical Subpattern). Indian Ocean: 12°S to 44°S.

Remarks

See under *Lampanyctus* sp. A (p. 83).

Lampanyctus ?ater Tåning, 1928

Fig. 13

Description

D 15–16; A 17–18; P 12; AO 5+7 (8), total 12 (13); GR (first arch) 5+1+11, total 17; GR_1 (second arch) 1, ix; Ll 32–33.

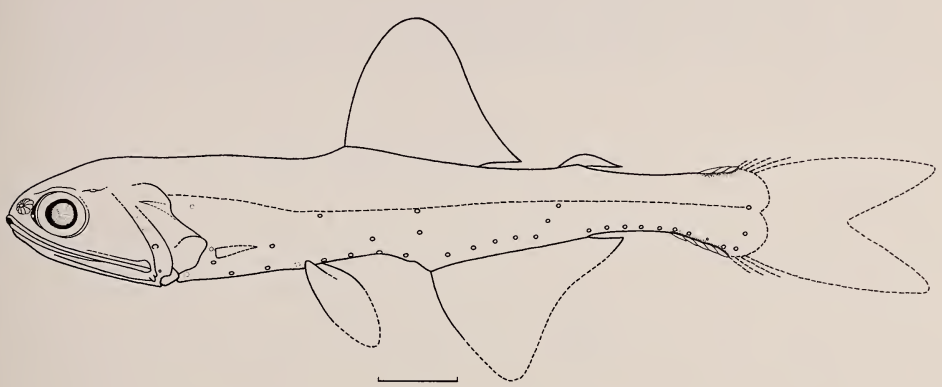

Fig. 13. *Lampanyctus ?ater* (SM 99). Scale 10 mm.

Origin of dorsal fin well behind vertical through outer ventral base, with Pre D 45–47% SL; origin of anal fin below posterior third of dorsal base. Origin of adipose fin well in advance of vertical through last anal ray. Pectoral fin weakly developed, probably extending to about PO_3; ventral fin reaching anus.

Dn absent; Vn small. Op_1 minute, below level of posterior margin of maxilla; Op_2 slightly in advance of Op_1, below level of ventral margin of orbit. 5 PO, with PO_4 elevated and slightly behind vertical through PO_3 or midway between PO_3 and PO_5. PVO_1 above PO_1–PO_2 interspace, closer to PO_2 and at level of posterior end of maxilla; PVO_2 above PO_1, at level of upper pectoral base. PLO about two photophore diameters below lateral line. VLO about above VO_1 and in contact with lateral line. SAO series angulate, with SAO_1 closer to VO_3 than to VO_2 and at level of PO_4, with SAO_2 above anus or anal origin, closer to VO_4 than to AOa^1, or equidistant, and with SAO_3 above anus or anal origin, in contact with lateral line. AOa evenly spaced and slightly arched; AOp level and not markedly separated from Prc series. Pol_1 behind vertical through last AOa; Pol_2 below origin of adipose fin, in contact with lateral line. Prc series arched, concavity directed anterodorsally; Prc_2 at about level of Prc_1; Prc_3 slightly in advance of vertical through Prc_4; and Prc_4 at lateral line.

Supracaudal gland consisting of 3 overlapping scales; infracaudal gland consisting of 4 overlapping scales, extending 46–49% of distance between procurrent caudal rays and base of last anal ray.

Remarks

The taxonomic status of these specimens is at present unclear and must await the publication of Zahuranec's (1980) thesis on the short-finned *Lampanyctus* species. The specimens most closely resemble *L. ater* and *Lampanyctus* sp. A in that the adipose origin is well in advance of the vertical through the base of the last anal ray, the Pol_2 is situated on the vertical through the adipose origin, and the infracaudal gland extends less than 60% of the distance between the procurrent caudal rays and the base of the last anal ray. While the lateral line counts suggest a similarity with those specimens identified as *Lampanyctus* sp. A, the AO_T, GR_T (first arch) and GR_I (second arch) indicate a closer affinity with *L. ater*.

Lampanyctus australis Tåning, 1932

Remarks

Stage IV females were taken by the *Meiring Naude* as far north as 28°S. SAM–27112 with 5 VO.

Lampanyctus festivus Tåning, 1928

Remarks

The three specimens taken by the *Meiring Naude* are immature.

Lampanyctus lepidolychnus Bekker, 1967

Remarks

Hulley (1981: 203) has given diagnostic characters for the separation of this species from *L. intricarius*. Among these is the fact that 'CPD is greater than HD' in *L. lepidolychnus*, where HD is measured on the vertical through the posterior end of the upper jaw. This is erroneous and should read 'CPD is greater than head depth as measured on the vertical through the middle of the orbit'. Specimens of *L. lepidolychnus* from the *Meiring Naude* cruises show the following variation in these two meristics: CPD 1,0–1,3 (mean 1,1) times in head depth, as measured on the vertical through the middle of the orbit; and CPD 0,7–0,8 (mean 0,7) times in HD (measured on the vertical through the posterior end of the upper jaw). The diagnostic 'CPL in UJ' varies 1,5–3,1 in *Meiring Naude* specimens, the values being negatively related to increasing SL. In view of the above, the most reliable character for the separation of *L. lepidolychnus* and *L. intricarius* is the length of the pectoral base in relation to the vertical distance between the lower margin of the orbit and the upper lip, measured at the middle of the orbit. Consequently, the lengths of the pectoral fins are also diagnostic, but these are often broken.

Lampanyctus nobilis Tåning, 1928

Remarks

The two *Meiring Naude* specimens are immature.

Lampanyctus pusillus (Johnson, 1890)

Remarks

The *Meiring Naude* material included only stage IV females; stage V females are known from the southern African east coast region (SAM data).

Lampanyctus turneri (Fowler, 1934)

Remarks

SAM–28064 with 5 VO on left side. Stage V females were taken by the *Meiring Naude* as far south as about 31°S. The least depth of capture during the cruises was 212–0 m.

Lampanyctus sp. A

Fig. 14

Description

D 14; A 18; P weakly developed; AO 5+6, total 11; GR (first arch) 4+1+10, total 15; GR_1 (second arch) 1, viii–ix; Ll 31–32.

Origin of dorsal fin well behind vertical through outer ventral base, with Pre D 48–49% SL; origin of anal fin below about middle of dorsal base. Origin of adipose fin well in front of vertical through base of last anal ray. Pectoral fin weakly developed, probably not extending beyond level of PO_3; ventral fin reaching to origin of anal fin.

Dn absent; Vn small. Op_1 minute, below level of posterior end of maxilla; Op_2 slightly posterior to Op_1, below level of ventral margin of orbit. 5 PO, with PO_4 elevated above level of upper pectoral base and behind vertical through PO_3. PVO_1 above PO_1–PO_2 interspace, closer to PO_2 than to PO_1 and at level of posterior end of maxilla; PVO_2 at level of upper pectoral base. PLO about two photophore diameters below lateral line. VLO above VO_1, in contact with lateral line. 4 VO, level, with VO_2–VO_3 interspace greatest. SAO series angulate, with SAO_1 closer to VO_3 than to VO_2 and at level of PO_4, with SAO_2 on or pos-

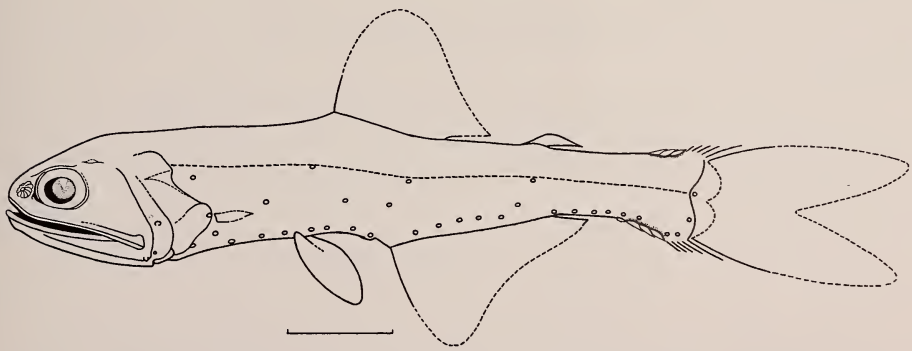

Fig. 14. *Lampanyctus* sp. A (SM 125). Scale 10 mm.

terior to vertical through anal origin, and with SAO_3 about above AOa^1 and in contact with lateral line. AOa series slightly arched; AOp series level and noticeably separated from Prc series. Pol_1 behind vertical through last AOa; Pol_2 on or behind vertical through origin of adipose fin and in contact with lateral line. Prc series arched, concavity directed anterodorsally; Prc_2 at level of Prc_1; Prc_3 slightly in advance of vertical through Prc_4; and Prc_4 at level of lateral line.

Supracaudal gland consisting of 3 overlapping luminous scales; infracaudal gland consisting of 4 overlapping scales, the first of which may be separated from the rest of the series, extending 46–48% of distance between procurrent caudal rays and base of last anal ray.

Remarks

Due to the fact that the taxonomy of the short-finned *Lampanyctus* species is at present under review (Zahuranec 1980), specific names have not been given to the two specimens taken by the *Meiring Naude*. These specimens and *L. ater* differ from *L. achirus* and an as yet unnamed species (*Lampanyctus* sp. B), which is known from off the west coast of South Africa, in that the origin of the adipose fin is well in advance of the vertical through the base of the last anal ray. Consequently, the Pol_2 is situated on or behind the vertical through the adipose origin. Further, the infracaudal gland does not extend more than 55–60% of the distance between the procurrent caudal rays and the base of the last anal ray (in the *L. achirus*-group extending 60–100% of that distance). The specimens may be separated from *L. ater* by the fewer number of lateral line organs, the lower GR_T (first arch) count and the number of tooth patches on GR_1 (second arch). *Lampanyctus* sp. B was not present in the *Meiring Naude* material.

Lobianchia dofleini (Zugmayer, 1911)

Remarks

No specimens larger than about 36 mm have been taken off the east coast (*Meiring Naude* and SAM data; Nafpaktitis 1978). Females are sexually mature (stage V) from about 34 mm in the southern African region.

Lobianchia gemellarii (Cocco, 1838)

Remarks

No sexually mature specimens were taken by the *Meiring Naude*, but SAM data indicate that stage IV specimens (49–58 mm) are known from the region. No specimens greater than about 56 mm are known from the western South Indian Ocean.

Myctophum asperum Richardson, 1845

Remarks

No sexually mature specimens were taken by the *Meiring Naude*. During these cruises, most specimens (78%) were taken at the surface at night, at tem-

peratures between 23,68 °C and 24,61 °C; the temperature at 200 m for all stations at which the species was taken varied between 13,10 °C and 16,75 °C.

Myctophum aurolaternatum Garman, 1899

Fig. 15

Myctophum aurolaternatum Garman, 1899: 264, pl. 55, fig. 3 (06°21'N 80°41'W). Brauer, 1906: 162. Sarenas, 1954: 390, fig. 4. Nafpaktitis & Nafpaktitis, 1969: 28, fig. 10. Kotthaus, 1972*b*: 23, figs 266, 283, pl. 1 (5). Kawaguchi & Aioi, 1972: 167, figs 5–6. Kawaguchi *et al.*, 1972: 28, fig. 10. Hartmann & Clarke, 1975: 365. Wisner, 1976: 54, fig. 47. Parin *et al.*, 1977: 111. Gjøsaeter, 1981: 220. Gjøsaeter & Beck, 1981: 257.

Description

D 14; A 24; P 15; AO 10 (11)+7, total 17 (18); GR 5 (4)+1+11 (12), total 17.

Origin of dorsal fin behind vertical through outer ventral base; origin of anal fin slightly behind vertical through base of last dorsal ray. Origin of adipose fin in advance of vertical through base of last anal ray. Pectoral fin reaching to level of VO_2 or VO_3; ventral fin extending almost to origin of anal fin. Posterodorsal margin of operculum serrate. Scales cycloid.

Dn and Vn small. Op_1 opposite posterior end of maxilla; Op_2 above Op_1, at level of ventral margin of orbit. PLO midway between lateral line and upper base of pectoral fin or closer to upper pectoral base. 5 PO, evenly spaced and level. PVO_1 above PO_2 and slightly above level of Op_1; PVO_2 at lower pectoral base. 4 VO, evenly spaced and level. SAO series straight, with SAO_1 directly above VO_4, with SAO_2 above anus, and with SAO_3 above or slightly behind vertical through anal origin and in contact with lateral line. AOa series level; AOp^1 above anal base. Pol well in advance of vertical through adipose origin, above last AOa and in contact with lateral line. 2 Prc, less than one photophore diameter apart and with Prc_2 raised.

Maximum length 105 mm.

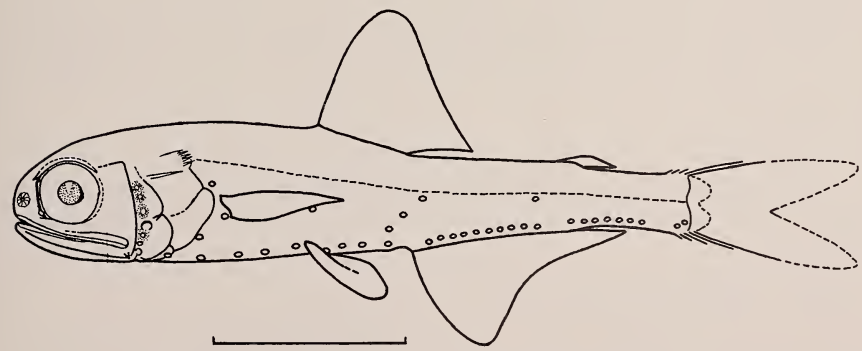

Fig. 15. *Myctophum aurolaternatum* (SM 95N). Scale 10 mm.

Distribution

High-oceanic, mesopelagic: nyctoepipelagic at the surface and down to 200 m. Indian Ocean: (western sector) Zanzibar to Gulf of Aden, including Sofala Bank; (eastern sector) 05°S to 18°S; south-eastern Asian seas; Pacific Ocean: western, central and eastern Equatorial regions.

Remarks

The three specimens, all immature, which were taken at the surface and down to 212 m by the *Meiring Naude*, represent the first record of the species in the southern African region.

Myctophum phengodes (Lütken, 1892)

Remarks

No sexually mature specimens were taken by the *Meiring Naude*. Surface temperatures at the capture stations varied between 22,92 °C and 24,40 °C, and would substantiate the 15 °C and 25 °C surface isotherm limits for the distribution of the species (Hulley 1981).

Myctophum spinosum (Steindachner, 1867)

Remarks

No sexually mature specimens were taken by the *Meiring Naude*.

Notolychnus valdiviae (Brauer, 1904)

Remarks

No sexually mature specimens were taken by the *Meiring Naude*.

Notoscopelus (Notoscopelus) caudispinosus (Johnson, 1863)

Fig. 16

Scopelus caudispinosus Johnson, 1863: 42 (off Madeira).
Notoscopelus elongatus (*non* Costa) Grindley & Penrith, 1965: 283 (*partim*).
Notoscopelus caudispinosus: Nafpaktitis & Nafpaktitis, 1969: 66, figs 38, 40. Parin *et al.*, 1977: 128, fig. 21.
Notoscopelus (Notoscopelus) caudispinosus Nafpaktitis, 1975: 76, figs 1–2. Nafpaktitis *et al.*, 1977: 248, figs 173–174. Hulley, 1981: 243, fig. 116.

Description

D 27; A 20–21; P 12; AO 7+4 (5), total 11 (12); GR 4+1+9, total 14.

Origin of dorsal fin slightly behind vertical through outer ventral base; origin of anal fin below about middle of dorsal base. Origin of adipose fin slightly in front of vertical through last anal ray. Pectoral fin reaching to ventral base; ventral fin reaching to about anus.

Dn and Vn present. Op_1 more or less opposite posterior end of maxilla; Op_2 above Op_1, below level of ventral margin of orbit. 5 PO, level, with PO_1–PO_2 interspace greatest. PVO_1 at lower pectoral base; PVO_2 above upper pectoral

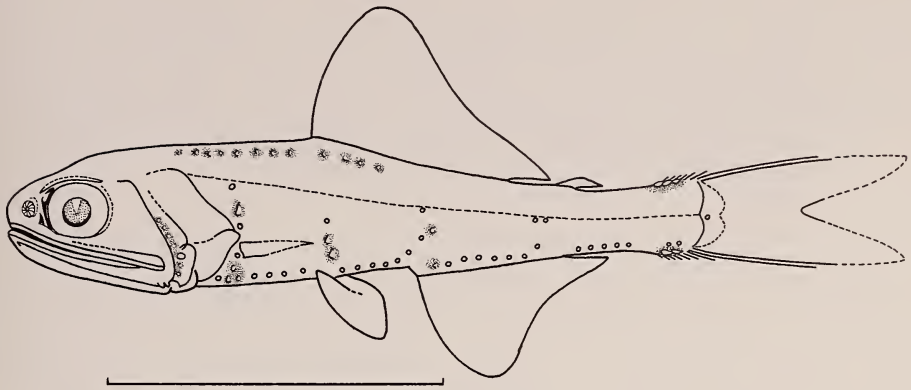

Fig. 16. *Notoscopelus (Notoscopelus) caudispinosus* (SM 189D). Scale 10 mm.

base. PLO immediately below lateral line. 5 VO, evenly spaced, with VO_5 sometimes distinctly raised. VLO above ventral base, midway between ventral base and lateral line. SAO series obtusely angulate, with SAO_1 about two photophore diameters posterodorsad to VO_5, with SAO_2 above anal origin, and with SAO_3 about on vertical through SAO_2 and in contact with lateral line. 2 Pol, horizontal, immediately below lateral line and in advance of vertical through adipose origin. 3 Prc; with Prc_2 about one photophore diameter behind Prc_1 and level with it; and with Prc_3 about one photophore diameter below level of lateral line. Luminous tissue on nape and below anterior part of dorsal fin; between PLO and PVO_2; in region of PO_1, PVO_1, PO_2; between VLO and ventral base; in region of SAO series and AOa^1; and below ventral procurrent caudal rays.

Maximum length 140 mm.

Distribution

High-oceanic, mesopelagic: day, deeper than 1 000 m; nyctoepipelagic at surface and down to 175 m. Atlantic Ocean: Broadly Tropical Pattern (Holoeurytropical Subpattern). Indian Ocean: 07°56′S 65°14′E. South-eastern Asian seas. Pacific Ocean: off Hawaii.

Remarks

The *Meiring Naude* specimens, all immature, represent the first record of the species in the southern African region, with the shallowest depth of capture being 212–0 m.

Notoscopelus (Notoscopelus) resplendens (Richardson, 1845)

Remarks

Stage V females were taken in the region by the *Meiring Naude*.

Symbolophorus evermanni (Gilbert, 1905)

Fig. 17

Myctophum evermanni Gilbert, 1905: 597 (south of Oahu, Hawaii).
Symbolophorus evermanni: Nafpaktitis & Nafpaktitis, 1969: 29, figs 30–31. Kotthaus, 1972*b*: 26, figs 270, 283, pl. 1 (2). Wisner, 1976: 50, figs 44–45. Parin *et al.*, 1977: 110. Gjøsaeter, 1981: 220, fig. 19. Gjøsaeter & Beck, 1981: 257.

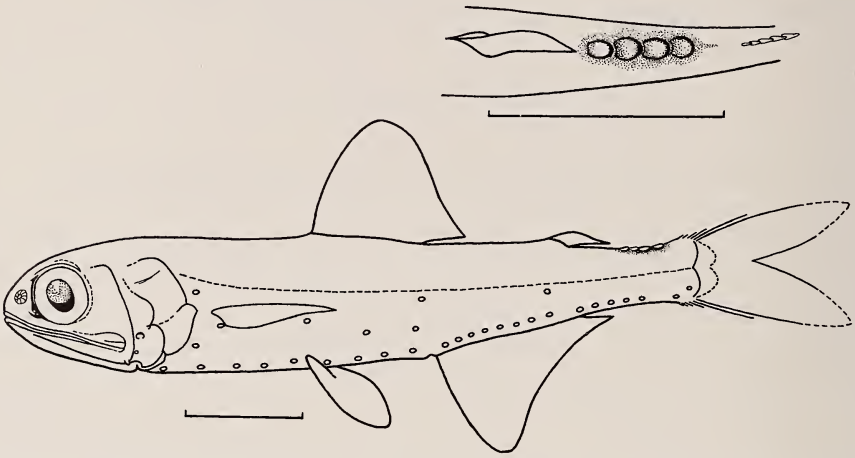

Fig. 17. *Symbolophorus evermanni* (SM 63), with dorsal view of supracaudal luminous gland (♂). Scales 10 mm.

Description

D 14–15 (13–16); A 20 (19–21); P 14–15 (16); AO 8 (7–9) + 5 (4–6), total 13 (12–14); GR 5 (6) + 1 + 14 (13), total 20 (19–21). One specimen (SAM–29087) with two SAO_1 photophores on left side.

Origin of dorsal fin above ventral base; origin of anal fin behind vertical through base of last dorsal ray. Origin of adipose fin well in advance of vertical through base of last anal ray. Pectoral fin extending to midway between VLO and SAO_1 or to level of SAO_1; ventral fin extending to about VO_4.

Dn and Vn present. Op_1 opposite posterior end of maxilla; Op_2 above Op_1, below level of ventral margin of orbit. 5 PO, evenly spaced and level. PVO_1 slightly in advance of vertical through PO_2 and below level of Op_2; PVO_2 at lower pectoral base. PLO two or more photophore diameters below lateral line. VLO on or slightly in advance of vertical through outer ventral base, nearer to lateral line than to ventral base. 4 VO, evenly spaced and level. SAO series angulate, with SAO_1 on vertical through VO_2 or closer to VO_2 than VO_3 and about equidistant between SAO_2 and VLO, with SAO_2 slightly behind vertical through VO_4 and at level of SAO_1, and with SAO_3 above anus, about one

photophore diameter or less below lateral line. AOa evenly spaced and level; AOp evenly spaced and level, usually with AOp^1 above anal base. Pol on vertical through adipose origin. Prc_2 about one and half photophore diameters behind Prc_1 and elevated.

Males with 4–6 overlapping, luminous scales supracaudally.

Maximum length 80 mm.

Distribution

High-oceanic, mesopelagic: nyctoepipelagic at surface at night. Tropical waters of Indo-Pacific Ocean.

Remarks

The specimens represent the first record of the species in the southern African region. No sexually mature females were taken by the *Meiring Naude*.

Taaningichthys bathyphilus (Tåning, 1928)

Fig. 18

Lampadena bathyphilus Tåning, 1928: 63 (25°11'N 20°57'W).
Taaningichthys bathyphilus: Nafpaktitis & Paxton, 1968: fig. 10 (9). Davy, 1972: 70, figs 3, 5, 6B, 6D. Nafpaktitis, 1973: 38, fig. 35. McGinnis, 1974: 133, figs 30, 58. Wisner, 1976: 145, figs 131–132. Parin *et al.*, 1977: 122. Nafpaktitis *et al.*, 1977: 189, figs 127–128. Hulley, 1981: 168, fig. 77.

Description

D 13; A 13 (12); P 13 (12); AO 2–3 + 1, total 4; GR 3 (4) + 1 + 7, total 11 (12).

Origin of dorsal fin well behind vertical through outer base of ventral fin; origin of anal fin well behind vertical through base of last dorsal ray. Origin of adipose fin on vertical through base of last anal ray. Pectoral fin extending to base of ventral fins; ventral fin reaching to about anus. Crescent of whitish tissue on posterior half of iris.

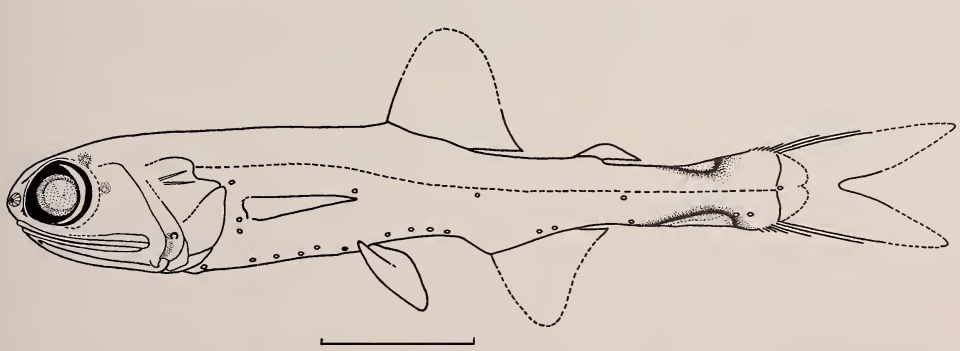

Fig. 18. *Taaningichthys bathyphilus* (SM 138). Scale 10 mm.

Dn absent; Vn present. Op_2 opposite posterior end of maxilla. 6 PO, with PO_1–PO_2 interspace greatest. PVO_1 above PO_1–PO_2 interspace, closer to PO_2 than to PO_1 and below level of ventral margin of orbit; PVO_2 directly above PVO_1, at level of lower pectoral base. PLO closer to horizontal septum than to upper pectoral base. VLO above ventral base, closer to horizontal septum than to ventral base. VO series level. SAO behind vertical through last VO and about one photophore diameter below horizontal septum. AOa well behind origin of anal fin; AOp in front of infracaudal gland. Pol well behind base of adipose fin, about one photophore diameter below horizontal septum. Prc_1, Prc_2 about one photophore diameter apart; Prc_3 at level of horizontal septum.

Supracaudal gland black-edged, occupying about 30% of distance between procurrent caudal rays and base of adipose fin; infracaudal gland larger, occupying about 50% or more of distance between procurrent caudal rays and base of anal fin.

Maximum length 80 mm; sexually mature from about 57 to 61 mm.

Distribution

High-oceanic, bathypelagic: generally below about 700 m, but with shallowest depth of capture at 400 m. Widespread pattern in all three oceans, generally between about 43°N and 68°S.

Remarks

The *Meiring Naude* specimens represent the first record of the species in the southern African region. One female specimen (SAM–28090) at stage III.

Triphoturus nigrescens (Brauer, 1904)

Fig. 19

Myctophum (Lampanyctus) nigrescens Brauer, 1904: 403 (03°24′06″S 58°38′01″E); 1906: 241, fig. 158.
Myctophum (Lampanyctus) micropterum Brauer, 1906: 239, fig. 157 (*partim*).
Lampanyctus microchir Gilbert, 1913: 101 (Suruga Bay, Japan).
Triphoturus microchir: Nafpaktitis & Nafpaktitis, 1969: 55, figs 62, 70. Kotthaus, 1972*b*: 29, fig. 284. Clarke, 1973: 406, fig. 12. Hartmann & Clarke, 1975: 636. Parin *et al.*, 1977: 125.
Triphoturus nigrescens: Wisner, 1976: 165, fig. 155.

Description

D 14 (13–15); A 16–17 (15–18); P 8; AO 4–5+6 (5), total 10–11; GR 3+1+8 (7), total 12 (11).

Origin of dorsal fin well behind vertical through ventral base; origin of anal fin under middle of dorsal base or slightly more anterior. Origin of adipose fin on vertical through base of last anal ray. Pectoral fin reaching to about PO_4; ventral fin extending slightly posterior to VO_4.

Dn absent; Vn present. Op_1 low down, at about level of PO_1; Op_2 well below level of ventral margin of orbit. 5 PO, with PO_1–PO_2 interspace greatest

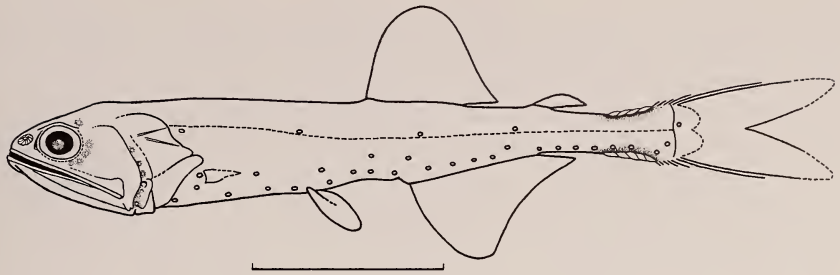

Fig. 19. *Triphoturus nigrescens* (SM 157). Scale 10 mm.

and with PO_4 elevated and anteriorly displaced to directly on, anterior to or behind vertical through PO_3 and at level of upper pectoral base or slightly higher. PVO_1 above PO_1–PO_2 interspace, closer to PO_1 than to PO_2 and at about level of Op_2; PVO_2 on or slightly behind vertical through PVO_1 and below level of upper pectoral base. PLO well in advance of vertical through upper pectoral base, at or less than one photophore diameter below lateral line. 5 VO, with VO_2 elevated and anteriorly displaced to before VO_1. SAO angulate, with SAO_1 nearer to VO_3, above VO_3–VO_4 interspace or above VO_4 and at level of ventral margin of orbit, with SAO_2 above anal origin and at level of SAO_1, and with SAO_3 behind vertical through anal origin and touching lateral line. AOa level, with AOa^1—AOa^2 interspace greatest; AOp level. 2 Pol, with Pol_1 behind last AOa and with Pol_2 in advance of vertical through adipose origin and touching lateral line. 3 Prc, in straight ascending line, with Prc_2 nearer to Prc_1 and touching line through centres of Prc_1 and Prc_3, or slightly below this line; Prc_3 above level of lateral line.

Supracaudal gland with 4 overlapping, luminous scales; infracaudal gland with 5 overlapping, luminous scales.

Maximum length 40 mm.

Distribution

High-oceanic, mesopelagic: in upper 24 m at night. Indian Ocean: 08°N to 15°S. Pacific Ocean: 30°N to 30°S (but see *Remarks*).

Remarks

No sexually mature specimens were taken during the *Meiring Naude* cruises.

The taxonomic status of species of the genus *Triphoturus* in the Indo-Pacific is at present unresolved. Hulley (1981) has pointed out that the type series of *Myctophum (Lampanyctus) micropterum* Brauer, 1906, comprises two species: *Lampanyctus isaacsi* Wisner, 1974 (ZMB 17614, 17615—Gulf of Guinea) and *Triphoturus micropterus* (ZMB 17616—east of Seychelles), and for the purposes of stability has designated the latter specimen as the lectotype of *T. micropterus*.

Further, he finds no differences between this lectotype and the descriptions of *T. microchir* (Gilbert) given by Gilbert (1913) and by Nafpaktitis & Nafpaktitis (1969). Accordingly, he has synonymized *T. microchir* with *T. micropterus*.

On the other hand, Wisner (1976) has synonymized *T. microchir* (Gilbert) with *T. nigrescens* (Brauer), as there appear to be no differences warranting the retention of Gilbert's species. This would suggest, therefore, that *T. nigrescens, T. micropterus* and *T. microchir* may all be synonyms, with *T. nigrescens* having priority. Until a fuller investigation can be carried out, this synonymy is followed in the present paper.

DISCUSSION

The relatively low numbers of myctophids taken during the *Meiring Naude* cruises are indicative of both the types of gear employed and its deployment at night at fishing depths below the major concentrations of lantern-fishes. The IKMT and RMT were fished at 12 stations in depths of 400 m or less, of which only 10 were occupied after sundown, and at 47 stations in depths greater than 400 m, of which 22 were occupied during daylight hours (Louw 1977, 1980). These facts, coupled to the limited sampling both in geographic extent (*c.* 27°S–34°S) and in seasonality (May–June), severely restrict the potential for zoogeographic analysis of the data. Hulley (1981) has pointed out that in such an analysis ecological differences should be distinguished, so that the distribution patterns of oceanic species (both mesopelagic and bathypelagic) and pseudoceanic species (with pelagic and epibenthic modes of life) may be separately compared. Johnson (1982) has reviewed the papers covering Indian Ocean zoogeography and recognizes five groups of species for the families Scopelarchidae and Evermannellidae, namely Transition Region Species (= Convergence Species), Subtropical Species, Tropical–Subtropical Species (= Broadly Tropical Species), Tropical Species, and Species Occurring North of 10°N.

Although two pseudoceanic species are known from the western South Indian Ocean, only the pelagic species *Diaphus garmani* was taken during the *Meiring Naude* cruises. In the Atlantic this species is restricted to the western provinces, with a southern limit at about 10°S in the Amazonian Region (Hulley 1981), probably due to the lens of high temperature, high salinity, and low productivity water off the north-east coast of Brazil. *D. garmani* appears to be more widespread in the Indo-Pacific (Nafpaktitis 1978: fig. 9; Kawaguchi & Shimizu 1978: fig. 54) and, due to the absence of an equivalent gyral lens, extends to about 31°S in the southern African region. The epibenthic species *Diaphus watasei* is known from the Mozambique Channel (Gjøsaeter & Beck 1981) and has now been recorded from as far south as 30°05′S 31°05′E in 366–0 m (SAM data).

Two bathypelagic species, *Taaningichthys bathyphilus* (Widespread Pattern) and *Lampanyctus achirus* (South Temperate Pattern: Subantarctic Subpattern), were taken by the *Meiring Naude*. *T. bathyphilus* occurred at three stations with

fishing depths of 750–0 m, 830–0 m and 916–0 m respectively, but only at the latter station were temperature data below 250 m available. Here, the upper 600 m was warmer than 10,5 °C, but a temperature of less than 5,68 °C was recorded at 800 m and below. *Lampanyctus achirus* occurs northward to the position of the Subtropical Convergence in the western sector of the South Atlantic (Hulley 1981), but data from the *Meiring Naude* cruises indicate that it may be taken as far north as 31°S in the western South Indian Ocean. This is well to the north of the Subtropical Convergence as drawn by Deacon (1937), and is no doubt due to the influence of cold Antarctic Intermediate Water, which underlies the core of the Agulhas Current, especially along its western boundary (De Decker & Mombeck 1965; Carter 1977).

This same water mass and its associated upwelling phenomena (Carter 1977) can also be correlated with the occurrence of cold water mesopelagic species off the east coast. The subantarctic species *Diaphus hudsoni* was taken north to about 27°S, while the Convergence Subpattern species (*Hygophum hanseni, Gonichthys barnesi*, and *Lampadena notialis*) apparently have a northern limit at about 30°S. The deeper-living convergence species *Lampanyctus australis* and *Lampanyctus lepidolychnus* were taken throughout the sampling area, as were the temperate species *Diaphus metopoclampus* (recorded to north of the Equator—Nafpaktatis 1978) and *Lampadena speculigera*.

Apart from *Taaningichthys bathyphilus*, all new records for the southern African region are species that have a tropical-subtropical distribution and specimens that may be actively transported into the region (? as expatriates) by the Agulhas Current. Five of these species (*Benthosema fibulatum, Diaphus aliciae, Hygophum proximum, Myctophum aurolaternatum*, and *M. obtusirostre*) were taken only in Bongo hauls or neuston tows, while 68,7% and 82,6% of the specimens of *Diogenichthys panurgus* and *Symbolophorus evermanni* respectively were obtained from these gears. Further, the new records of species taken at IKMT and RMT stations (*Diaphus jenseni, D. nielseni, D. problematicus,* and *Notoscopelus caudispinosus*) and records of *Triphoturus nigrescens*, from both RMT (64,7%) and Bongo (35,3%) nets consist mainly of juvenile specimens. This suggests, therefore, that distributional ranges of the breeding populations should be thoroughly investigated before any attempt at pattern analysis is made. Unfortunately the data at hand do not allow for this.

Pooled data from the *Meiring Naude* and other cruises at the South African Museum reveal that, except for *Diaphus effulgens* and *Myctophum phengodes*, stage IV and stage V females of the following subtropical species have been taken off the east coast of South Africa: *Hygophum hygomii, Lampanyctus ater, L. pusillus, Bolinichthys indicus, Symbolophorus barnardi,* and *Scopelopsis multipunctatus*. Stage IV and stage V females of the following tropical or broadly tropical species have been recorded from the region: *Benthosema suborbitale, Diaphus brachycephalus, D. diadematus, D. luetkeni, D. mollis, D. richardsoni, Diogenichthys panurgus, Hygophum proximum, Lampanyctus alatus, L. turneri, Lobianchia dofleini, L. gemellarii,* and *Notoscopelus resplendens*.

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